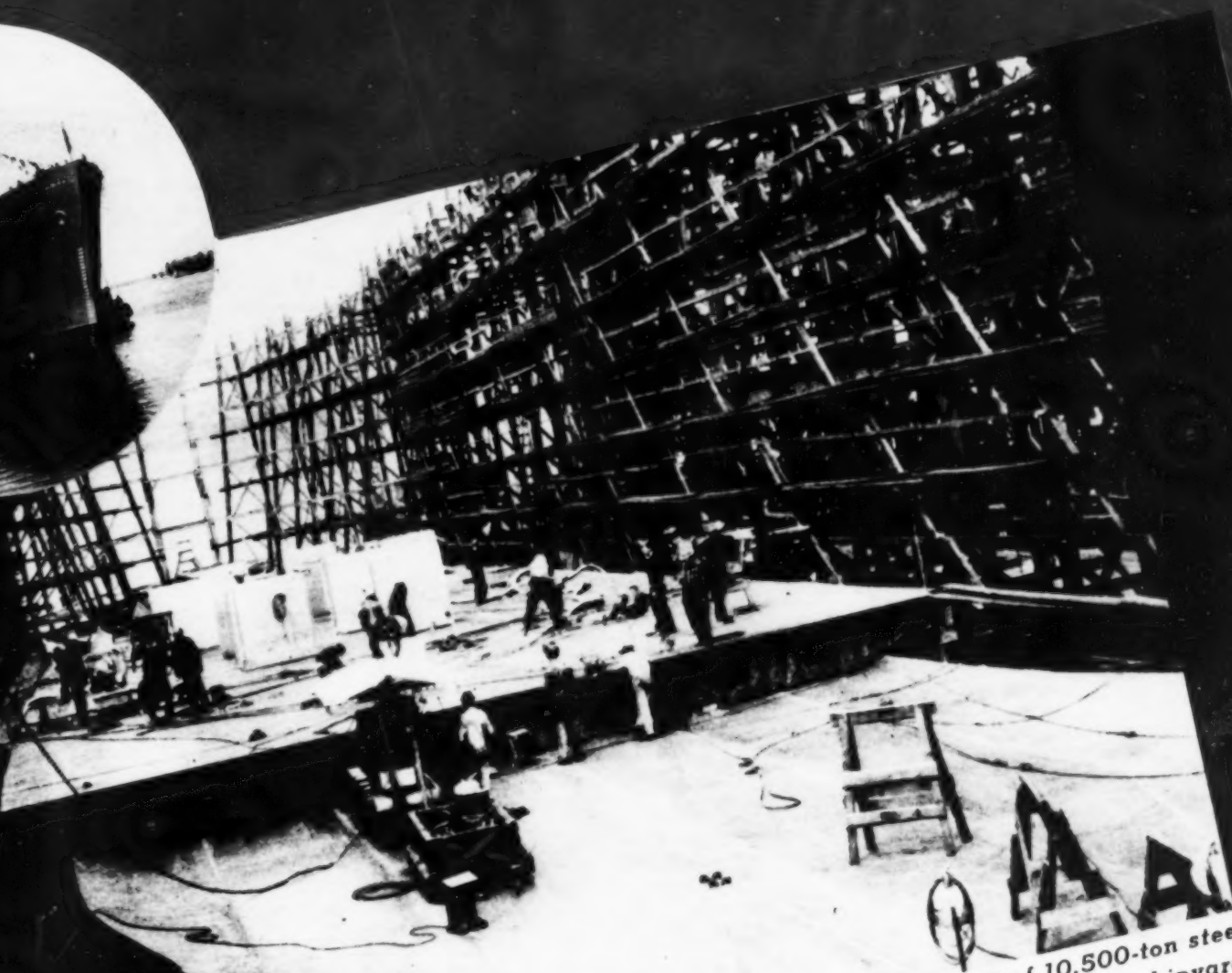


A PICTORIAL SURVEY OF CURRENT PRACTICE, EQUIPMENT AND MATERIALS

Construction Methods

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PREFABRICATED INNER BOTTOM SECTIONS of 10,500-ton steel cargo ships are welded to outer bottom at West Coast shipyard.

★
New Shipbuilding Technique Produces Steel Cargo Vessels in 46 Days •
Traffic Divider of Plain Concrete Saves 136 Tons of Steel • Navy
Warehouses Built of Wood to Save Steel • Power Shovel Cycles
Analyzed to Increase Output and Reduce Repairs — by F. C. Ruhloff.

**AUGUST
1942**

*This War Production Loss
can be*

Scrap Shortage Cuts Steel Rate

**Operations for Week
Scheduled at 98 Pct.**

Shortage of iron and steel scrap brought scheduled steel operations for this week to 98 per cent of rated capacity, a new low since April 25, the American Iron & Steel Institute's weekly report showed yesterday.

The week's operating rate, which represents output of 1,664,600 net tons of steel ingots, is only 0.3 point under the previous week's 98.3 per cent, representing an output of 1,669,700 net tons.

Steel operations have been declining since the record weekly output on a tonnage basis was set one month ago today. At that time the operating rate was 99.6 per cent of capacity, representing production of 1,691,800 net tons.

Three weeks ago the rate was 99.3 per cent and the next week it was the same.

A year ago steel operations were at 99.9 per cent, but that was based on a smaller weekly output of

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this page will start
all available scrap iron
and steel on its way
to the mills.**

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today!**

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CURRENT JOBS

.... and Who's Doing Them

BUILDINGS

Public—An industrial plant is under construction in Missouri by **Long Construction Co.**, of Kansas City and **Turner Construction Co.**, of New York, for approximately \$85,000,000. In Kansas a manufacturing plant will be built by **William S. Lozier**, of Rochester, N. Y., and **Broderick & Gordon Construction Co.**, of Denver, Colo., for \$50,000,000. **Lummus Co.**, of New York, will build a \$38,000,000 industrial plant in Texas; Defense Plant Corp. will finance. A \$20,000,000 industrial plant in Illinois is under construction by the **Austin Co.**, of Chicago. Navy Department awarded a \$13,200,000 contract for facilities in New York to **John W. Cowper, Inc.**, of Buffalo, and **Senior and Palmer, Inc.**, of New York City. In Texas, **Stone & Webster Engineering Corp.**, of Boston, Mass., will erect a \$12,000,000 industrial plant; Defense Plant Corp. will finance. **Cahill Bros.**, of San Francisco, were awarded an industrial plant contract in California, for \$12,000,000, to be financed by Defense Plant Corp. Contract to erect buildings in Utah, amounting to \$11,200,000, was awarded to **Ford J. Twatts Co.**, **Griffith Co.**, of Los Angeles, Calif., **Peter Kiewit & Sons Co.**, **Hill Field**, and **Morrison-Knudsen Co., Inc.**, of Boise, Idaho.

Successful bidder for munitions plant contract in L'Acadie, Quebec, Canada, was **H. J. O'Connell**, of Montreal, Quebec, with bid of \$10,000,000. **Geo. A. Fuller Co.**, of New York, will design and construct an industrial plant in Texas for \$9,000,000, to be Federally financed. An industrial plant is under way in Texas by **Austin Bridge Co.**, of Dallas, at an estimated total cost of \$8,500,000, to be financed by Defense Plant Corp. Housing project in Ohio is being constructed by **Hunkin-Conkey Construction Co.**, of Cleveland, for \$7,400,000. In Texas, **Ford, Bacon & Davis**, of Galveston, were awarded an industrial plant expansion contract amounting to \$7,000,000; Reconstruction Finance Corp. will finance. **Swinnerton & Walberg**, of San Francisco, were awarded an industrial plant contract in California, with bid of \$6,000,000, to be financed by Defense Plant Corp.

HEAVY CONSTRUCTION

A pipe line from Texas to Illinois is under construction by **War Emergency Pipeline, Inc.**, of Little Rock, Ark., for \$35,000,000 to be financed by Reconstruction Finance Corp. Contract for improvements in Tennessee was awarded by Navy Department to **Dunn Construction Co., Inc.**, and **Polk-Smartt Paving Co.**, of Birmingham, Ala., at cost of \$9,922,500. In Oregon, **Sound Construction & Engineering Co.**, of Seattle, Wash., will make improvements amounting to \$7,500,000 for Navy Department. Improvements in water and sewer lines in Wyoming are under way by **Morrison-Knudsen Co., Inc.**, of Boise, Idaho, at an estimated cost of \$5,000,000. Wells are under construction in Kansas by **Layne-Western Co.**, of Kansas City, Mo., for \$5,000,000. Improvements in Tennessee, estimated under \$3,000,000, are being made by **Boone Contracting Co.**, of Nashville. Successful bidders for improvements contract in Wyoming were **Rognstad & Olsen**, of Casper, and **Green Bros.**, of Worland, with bid of \$5,000,000. A contract for improvements and military housing in Kansas went to **A. J. Rife Construction Co.**, of Dallas, Tex., at an estimated cost of \$3,000,000. **Stevens Bros.**, and **Miller-Hutchinson Co.**, of New Orleans, La., were awarded a \$3,000,000 contract for improvements in Arkansas.

HIGHWAYS

Among recent highway contract awards are the following: Arkansas: \$595,148 to **Gregory-Hogan**, of Little Rock, California: \$476,225 to **Hemstreet & Bell**, of Marysville; \$562,280 to **N. M. Ball & Sons**, of Berkeley; \$217,126 to **Healey-Moore Co.**, of Oakland; \$238,866 to **Hemstreet & Bell**, of Marysville; \$217,592 to **W. J. Wilkinson & H. B. Scott**, of Watsonville, Connecticut: \$423,668 to **Oneglia & Gervasini, Inc.**, of Torrington; \$398,936 to **A. I. Savin Construction Co.**, of East Hartford, Georgia: \$437,886 to **W. L. Cobb, Inc.**, of Decatur; \$511,579 to **Hugh McMath Construction Co.**, of Columbus; \$459,948 to **Whitley Construction Co.**, of La Grange, Illinois: \$558,514 to **Powers Thompson Construction Co.**, of Joliet; \$212,549 to **Hurden Construction Co.**, of Springfield; \$340,897 to **Granite Bituminous Paving Co.**, of St. Louis, Mo.; \$454,732 to **Rockford Construction Co.**, of Rockford, Indiana: \$1,221,425 to **McMahan Construction Co.**, of Rochester, Kansas: \$745,181 to **M. W. Watson**, of Topeka, Michigan: \$549,933 to **Louis Garavaglia**, of Detroit; \$421,874 to **Julius Porath & Son Co.**, of Detroit; \$469,144 to **Chas. J. Rogers, Inc.**, of Detroit; \$249,237 to **Loselle Construction Co.**, of Wyandotte; \$304,680 to **Lewis & Frisinger Co.**, of Ann Arbor; \$209,274 to **Ann Arbor Construction Co.**, of Ann Arbor, Missouri: \$393,930 to **Odell & Riney Construction Co.**, of Hannibal, Nebraska: \$2,700,931 to **Abel Construction Co.**, and **Dobson and Robinson Construction Co.**, of Lincoln, New Jersey: \$824,871 to **Franklin Contracting Co.**, of Newark, Oklahoma: \$205,555 to **Brooks & Dahlgreen**, of Oklahoma City, North Dakota: \$320,986 to **Bismarck Construction Co.**, of Bismarck, Ohio: \$411,404 to **Thorpe Construction Co.**, of Akron, Pennsylvania: \$1,622,222 to **J. H. Swanger**, of Lancaster; \$657,343 to **Harrison Construction Co.**, of Pittsburgh; \$368,028 to **Fred Berlanti & Sons, Inc.**, of Harrison, N. Y. South Carolina: \$487,516 to **Ballenger Paving Co.**, of Greenville.

AUGUST, 1942

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Construction Methods

A Pictorial Survey of Current Practice, Equipment and Materials

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PUBLICATION

The HOW of it

For the benefit of readers concerned with the practical application of method or equipment the following references are to articles or illustrations in this issue that tell:

- How **SCREENING RIG** supplied cobble blankets for slopes of earth dam. —p. 39
- How **TRAFFIC DIVIDER** provided built-in safety on 9 mi. of parkway. —p. 42
- How **REVISED DESIGN**, substituting plain for reinforced concrete, saved 136 tons of steel. —p. 42
- How **LINE-CUTTING MACHINE** scored concrete pavement as first step in breaking out trench. —p. 43
- How **PAVEMENT BREAKER** shattered concrete to provide for traffic-dividing wall. —p. 44
- How **FIRST FLIGHT STRIP** along highway was completed to provide emergency landing area for airplanes. —p. 47
- How **WOOD-FRAME WAREHOUSES** for Navy saved both time and steel. —p. 48
- How **MOBILE DERRICKS** erected timber frames for warehouses. —p. 48
- How **PURLIN CLIPS** attached to girder allowed it to be slipped into place on columns. —p. 49
- How **LONG-SPAN GYPSUM PANELS**, nailed to purlins, formed interlocking deck on warehouse roof. —p. 50
- How **MAINTENANCE AND REPAIR** can be used to prolong life and increase service of construction equipment. —p. 52
- How **CONCRETE LINING** was placed by machine on sloping sides and bottom of canal. —p. 54
- How **LIGHT FOR NIGHT WORK** was supplied by mobile truck unit. —p. 54
- How **LIFTING AND HAULAGE** of 6-ton pontons for floating dredge pipe line was handled by tractor-crane. —p. 54
- How **TRENCHES FOR CONCRETE FOUNDATIONS** of Army buildings were excavated by vertical-boom ditcher. —p. 54
- How **STEEL SCAFFOLDS** were used to shore concrete forms for industrial building. —p. 55
- How **FLEXIBLE TIMBER MAT** was woven and sunk to prevent river bank erosion. —p. 55
- How **NEW SHIPBUILDING TECHNIQUE**, using prefabrication methods, produced steel vessels in 46 days. —p. 56
- How **ASSEMBLY AREAS** were laid out in shipyard to aid prefabrication. —p. 56
- How **STEEL INNER BOTTOM** of cargo vessel was turned over by gantry crane to expedite welding. —p. 57
- How **SHIP'S PLATES** were cut by oxyacetylene torch mounted on traveling carriage. —p. 58
- How **ANALYSIS OF SHOVEL CYCLES** enables contractors to increase output and decrease repairs. —p. 62

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Machine Tool Builders . . .

the men behind our war production achievement

IT TOOK GERMANY six years to get ready for this war, and Japan even longer. But in less than twenty-four months American industry, starting from scratch, has caught up with and surpassed the war production of the Axis.

When France fell in June, 1940, we unfortunately had no gigantic munitions makers, like the Krupp or Skoda works, to turn to. We had been devoting our attention to making refrigerators and vacuum cleaners and motor cars and lawn mowers. Ordnance output for our Army was a mere million dollars a month. A sad commentary on our National state of mind and our lack of responsible political leadership.

Yet during June of this year, our industries, transformed from peacetime pursuits, produced close to a thousand times that amount. A thousand-fold increase in two years!

The same spectacular gains hold throughout our war program—for ships, planes, guns, tanks, a thousand items. We are well on our way toward the 60,000 planes, 20,000 anti-aircraft guns, 45,000 tanks and 8,000,000 tons of shipping that the President asked us to produce in 1942, and toward the much larger production projected for the year 1943.

We are well on our way thanks to a number of factors, one of the most vital being the extraordinary job done by the machine tool industry. For it has equipped America's metal-working shops with the tools they need to turn out the vast quantities of war weapons.

The machine tool industry's importance springs from the fact that almost every metal product, from mechanical pencils to giant guns, is made with machine tools. They transform pieces of steel into parts for automobiles, farm implements and radios—and for airplanes, guns and tanks.

The Garand rifle, highly praised by General MacArthur at Bataan, has 72 metal parts requiring 1040 separate cutting operations on machine tools. A 40-millimeter gun mount is made up of 1500 separate parts, built to the tolerance of a Swiss watch. Each part must be machined, not once, but several times.

No wonder that when the American defense program was undertaken two summers ago, the American machine tool industry was the first to be called into service. Ninety-five thousand machines were wanted as quickly as possible from 250 builders who in peacetime had produced some 25,000 machines a year.

But the demand did not stop there. The Army, the Navy and the Air Force kept asking for more as the war production program was expanded again and again. Nor was that all. The entire anti-Axis world besieged Washington with urgent requests—from London to Moscow, from Ottawa to Chungking.

To a man the machine tool builders responded. New factories and additions to old plants

were built, with deliberate disregard of the prospect that all these sharply expanded facilities could not be used after the war.

To increase output from existing plants practically every company went to two long shifts or three short ones. The industry's work-week was greatly extended. From the beginning of our effort, it has been the longest of any industry.

Working forces were enlarged from 40,000 to 110,000, and this latter figure does not include tens of thousands of employees with sub-contracting firms. Though machine tool building requires a higher degree of individual skill than most products, "learner" courses have been set up to train men quickly. Over 15,000 men and women now are in training.

The machine tool builders were among the first to go in for sub-contracting. They have farmed out parts, subassemblies and complete machines right and left. To meet their needs, for example, repair shops of carpet mills are making milling machines, a laundry machinery company is producing radial drills, and an automobile body builder is making planers and boring mills.

Machine tool manufacturers quickly shelved peacetime practices to concentrate manufacture on the sizes and types of machines critically needed for the war program. They adopted mass production methods wherever possible, although machine tools are essentially a tailor-made product. They sent their sales engineers, as did machine tool dealers also, to hundreds of munitions makers with invaluable advice as to tooling up most efficiently for their particular jobs.

The swift action taken by the machine tool builders shows what private enterprise can do to meet a national emergency. They were the first to institute a voluntary system of priorities.

All of this involved an almost explosive expansion of the industry. Machine tool builders produced an average of only 7,500 machines a year from 1931 to 1934. In an ordinary year, output totals 25,000 machines. But in 1940, it rose to 112,500, and in 1941 to 187,500.

The 95,000 machine tools wanted for the original defense program were built and delivered within eight months.

Today more than 1,000 machine tools are being shipped to war factories every twenty-four hours, and for seven days a week. Each month's output exceeds that of an entire normal peacetime year and is five times that of the depression year of 1932. And each succeeding month is shattering all previous records.

It is this amazing performance that led Under Secretary of War Robert P. Patterson to declare that "machine tools are the foundation on which our production structure is built. American machine tool men are doing a stupendous job. Machine tools are now being turned out at a rate of \$1,380,000,000 a year. Machine tool designers have worked to improve tools so much that ma-

chine tool effectiveness today is one-third to one-half greater than it was in 1930. Our production today is 16 times what it was—in capacity to cut metal—at the peak of the World War."

The results of this performance by this key industry, so satisfying to the Nation, do not spring wholly from the numbers of machine tools produced. They stem also from their improved quality and greater productivity.

Today's warfare differs radically from that of 1917-1918. It calls for mechanized weapons so complicated in design and built to such a fine degree of accuracy that they are beyond comparison with the weapons of a generation ago.

Machine tools, completely redesigned during the depression years, are meeting these new and exacting requirements. In addition, thousands of machine tools of special design, without counterpart in peacetime work, have been built.

The record of the war industries most directly dependent on the machine tool industry speaks for itself. One tank manufacturer alone is producing more than thirty big tanks a day. A mid-western plant is completing 35 anti-aircraft guns a day, round the clock without interruption. A tank engine factory, tooled up to make 650 units a month, is actually building over 1500 a month. Demolition bombs, destined for Berlin and Tokyo, are being made by the tens of thousands every month. Machine guns are being produced at a rate of 50,000 a month.

These manufacturers, all machine tool users, are far in advance of the timetables set for them.

All this is good news for the American people and bad news for the Axis. It is proof that American industry, with each individual and specialized industry doing its part, is living up to the faith put in it by the American people.

But it is more than that, too. It is a guarantee of our confidence in the peacetime future of American industry and of the free enterprise system under which this miracle has been wrought.

Perhaps more than anything else, the foundation of that confidence must be faith in the far-sightedness, the ingenuity, the engineering and designing skill, and the managerial know-how of the machine tool makers.

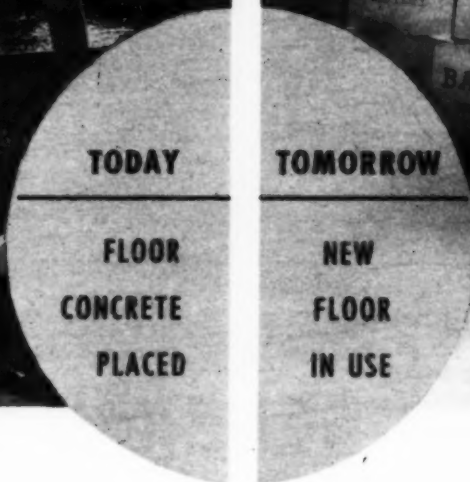
On them we depend for the most essential tools of the post-war production economy. Without them, our vision of better living standards and full employment through more efficient production and distribution can never be more than a vision.

What they have done as the toolmakers for war is proof of what they can do as the toolmakers of peace. How they have done it as free men is a demonstration of what free men will do.

James H. McGraw, Jr.

President, McGraw-Hill Publishing Company, Inc.

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Check your tires every 24 hours and be sure to maintain the pressure recommended on page six in your Euclid operator's manual. Your nearest Euclid distributor will be glad to supply this information if you don't have it available and our factory Service Department will make recommendations for any unusual conditions you may have. Remember, equipment tires are tough babies, but you've got to take good care of them now so they will give you every hour of service that's built into them.

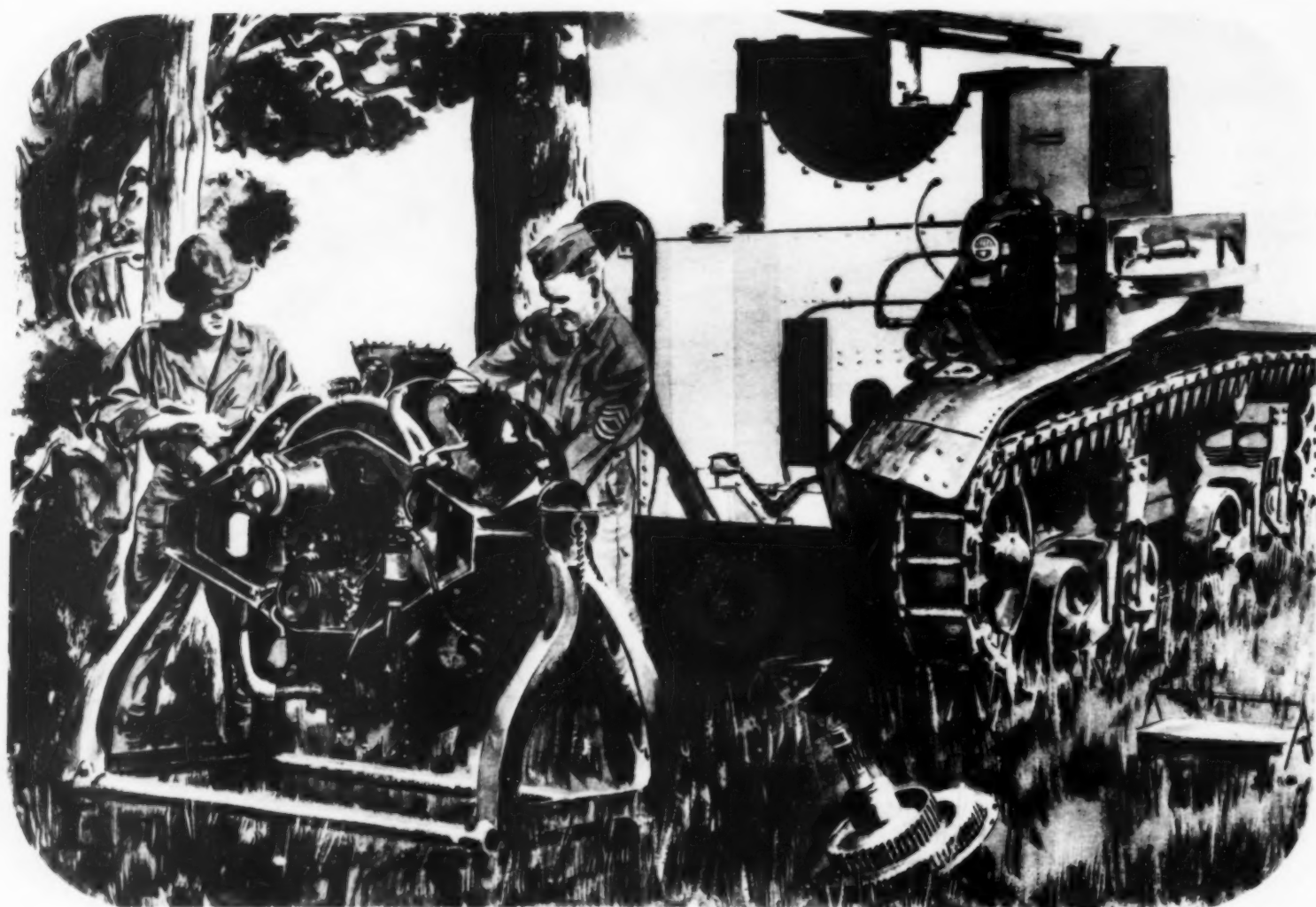
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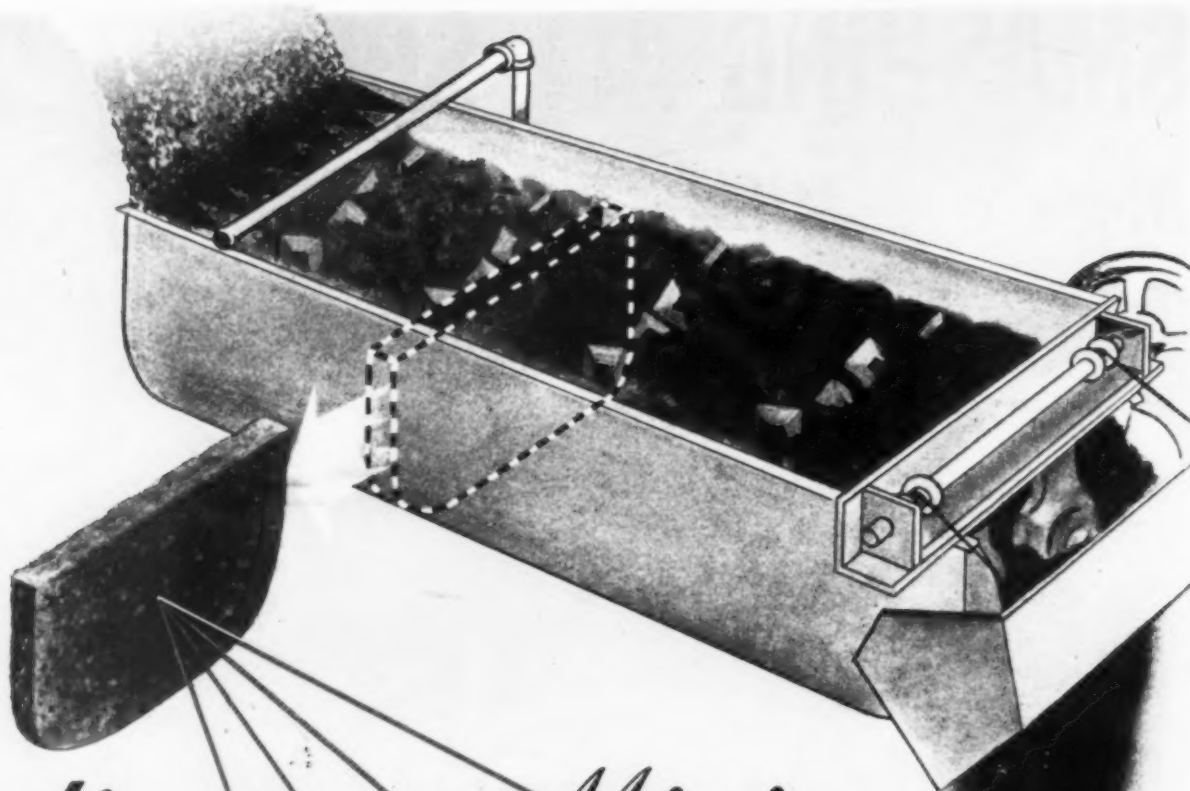
Produces stronger concrete—longer wearing—better weathering—corrosion resistant.

Eliminates "crazing" and surface softness.

Approved by United States engineers.

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MICHIGAN**

WRITE FOR LITERATURE to Department C-2 on this advanced method of curing concrete that saves time, labor, material—and does a better curing job.



Continuous Mixing

Why did Barber-Greene build a continuous mixer instead of the conventional intermittent batch type? The answer is in the diagram of the Barber-Greene shown above. At the upper left, the graded, and accurately measured aggregate continuously enters the pugmill in a small stream. In entering, it falls through the spray chamber where it is continuously sprayed with a small stream of metered bitumen. The combining process has started, even before the materials enter the pugmill. The need for preliminary dry mixing is completely eliminated. The Barber-Greene does not have to undo the segregation caused by dumping batches into the mill. In fact a cross section of the mix extracted just a few inches beyond the charging end of the pugmill contains the correct amount of each size of aggregate with the correct ratio of bitumen.

Here the propelling and retarding paddles work the material through the pugmill under pressure, using friction to take the excess from the fines and evenly coat the coarse material.

As the mix is constantly worked through (from left to right in diagram) there can be no dead material, even at the very bottom.

The Barber-Greene uses more horse-sense, and less horse-power. It attains complete homogeneity the easiest, most logical way. It has not only established new standards for accuracy and uniformity, — but has changed moving and erection from a major project to a simple low-cost maneuver. Barber-Greene Company, Aurora, Illinois.

42-1



BARBER GREENE



WITH construction equipment working overtime to speed completion of the projects vital to Uncle Sam's war effort, you can't afford delays due to tire trouble. Follow these simple ABC rules and you will be protected against costly breakdowns. More than that, your tires will last you longer!

A] Care for the Tires You Now Have

You must give your tires the *proper care!* Uncle Sam is so interested in this, a recent announcement said ration boards may refuse certificates to those neglecting or abusing tires.

Your B. F. Goodrich Dealer or B. F.

Goodrich Tire Engineer can give you expert advice in this matter. It will save you plenty in terms of extra tire mileage. Feel free to call on them at any time!

B] When You Must Buy . . .

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C] Fit the Tires to Your Job

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Gives universal traction forward and backward. Extra-heavy tread and sidewalls for resistance to cutting.



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**SHOVELS—DRAGLINES
CRANES**

True enough—modern machines, such as Link-Belt Speeder shovels, draglines and cranes have speeded up construction tremendously—they take the toughest jobs in their stride. Yet, to *keep* them "Building for Victory"—to maintain their efficiency, utmost care of all machinery is a vital necessity.

The days of immediate replacements are gone. Even though Link-Belt Speeder is building more shovels, draglines and cranes than ever before, deliveries are uncertain and may be delayed for months.

Link-Belt Speeder urges contractors to make machines last longer through better care than ever before. See your nearest distributor—he can help you. Remember: an extra inspection may prevent a major breakdown.

0015



LINK-BELT SPEEDER CORPORATION

Builders of the Most Complete Line of Shovels and Cranes

301 WEST PERSHING ROAD

CHICAGO, ILLINOIS

JAEGER Motorized CONCRETE PLANTS MEET YOUR PROBLEMS



LABOR SCARCITY IN DESERT — 8 "HIGH DUMP" 4 Yd. Units Averaged Over 120 Cu. Yds. Hourly of Minus 1" Slump Mix on California Bomber Range.



HIGH PRODUCTION: 95,000 Yds. for Ford Bomber Plant @ 2000 Yds. per 16 Hours—with 10 Jaeger "LOW CHARGE" 4 Yd. Units.

PLACING PROBLEMS: 40 Mobile 3 Yd. Jaegers Poured 1200 Igloos at Anniston, Ala.



CONTINUOUS POURS: 2065 Yds. in 31 Hours at Seattle Army Warehouse with Mixed Fleet of Ten 4 Yd. Units as Shown Here.

YOU OWE IT TO YOURSELF TO KNOW why more concrete is being mixed and placed by Jaeger Truck Mixers, Agitators than by any other method — why Jaegers produce higher strength, more workable concrete and bigger daily yardage, at lowest operating and maintenance cost. **SEND FOR COMPLETE CATALOG AND DATA — TODAY!**

• Only JAEGER Offers a Type for Every Need

"HIGH DUMP": Top-Loading, with Fast, Vacuum-Controlled Discharge Door, or Combination Top-or-End Loading—to meet conditions. 2 to 5 yd. sizes.

OR "LOW CHARGE": Fastest on market. 2 to 8 yd. sizes. All Jaegers have 2-Speed Transmission (Vacuum-Controlled Truck Engine or Separate Engine Drive), One-Shot Loading, Dual-Mix Drum, Fastest Discharge.

THE JAEGER MACHINE CO.
400 DUBLIN AVE., COLUMBUS, OHIO
World's Largest Manufacturer of Concrete Mixing Equipment — Pumps, Hoists, Concrete and Bituminous Paving Equipment.



Four 2 Yd. Units did 198 yds. in a day with this setup at Linthicum, N. C.





FIGHTING TIME in the BLACK OF NIGHT

THE sun slides down beyond the horizon, blacking out acres that are being transformed into an airfield. Lights flash on, tunneling slick shafts into the darkness, silhouetting hurrying figures and rumbling machines. The roar of engines pounds the air — the runway paving job rolls steadily on into the folds of night. Uncle Sam is working tirelessly around the clock to hasten the day that Victory will be won.

Let's watch a minute. A truck, its headlights stabbing the darkness, hurries across the field with its burden of material, black as the night itself, to the waiting hopper of an Adnun Paver. Watch the black carpet roll out behind the paver, smooth and level and accurate. Low visibility of the work doesn't hamper the operator. His hydraulic controls are banked within easy reach, adjustments are easy to make. He has the feel of the machine and is confident of the work it is doing as it rolls along unerringly, striking off the material to exact

cross section. Adnun Continuous Course Correction automatically levels out the surface irregularities. The Cutter Bar Strike-off makes tight, compact joints between parallel courses. The Power Cut-off stops flow of material with no tag end runouts at the end of the course. A 1,000 tons or more of material will go down tonight.

Tomorrow the runways will be nearer done — Uncle Sam will be nearer his goal because Adnun accuracy can be counted on even in the dim of night operations. To win the war now — to meet the competitive situation after the war, you need the speed, accuracy and savings that Adnuns can give you. Talk it over with your Foote dealer or write direct today.

THE FOOTE COMPANY, INC., Nunda, N. Y.

WORLD'S LARGEST
EXCLUSIVE BUILDERS
OF ROAD PAVERS

ADNUN

Make Your Ropes Last LONGER

Reading Time: 38 Seconds

Conserve steel for the nation by making every piece of equipment last longer. The operation of your machines depends upon wire rope. *Make your ropes last longer.* Here are a few suggestions:

- ★ Inspect, clean and lubricate all wire rope regularly. Tighten fittings. Be sure all fittings are properly applied, treated and maintained.
- ★ Be sure the rope is the proper one for the service. It should have proper strength, flexibility, resistance to abrasion, fatigue, crushing, heat, or other individual job factors.
- ★ If drums or sheaves are small or kinking tendency pronounced, specify LAY-SET PREFORMED, the rope that resists bending fatigue and kinking.
- ★ Check your sheave or drum grooves. Too large a rope or worn grooves cause pinching and rapid wear.
- ★ Sheaves and drums that are too small cause needless rope fatigue.
- ★ If the rope deviates from the center plane of the sheave more than 1½ degrees, undue wear will result.
- ★ Keep sheaves aligned and bearings tight and properly lubricated.
- ★ Don't allow bad spooling on drums. Hazard LAY-SET PREFORMED spools evenly under most conditions.
- ★ Don't jam on power or brake. Jerky operation accelerates rope failure.
- ★ Don't let a load spin and twist the rope.
- ★ Prevent rubbing of the rope against any standing part.

Get the experienced recommendation of a Hazard wire rope man. Specify Hazard LAY-SET PREFORMED for a rope that resists bending fatigue, kinking and snarling. Use LAY-SET because it spools better, is faster and safer to handle, lasts longer.

Keep equipment in good condition. Make it last longer.

HAZARD WIRE ROPE DIVISION

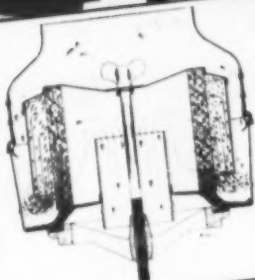
Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Fort Worth, Los Angeles,
New York, Philadelphia, Pittsburgh, San Francisco, Tacoma

AMERICAN CHAIN & CABLE COMPANY, Inc.
BRIDGEPORT, CONNECTICUT

HAZARD LAY-SET *Preformed* WIRE ROPE

COMPRESSOR VALVES...

active!



CLEAN AIR

is vital to efficient valve action. Clean your air filters regularly . . . and often with a non-flammable cleaning solution.



CLEAN OIL

is equally important. Drain crankcases and refill to correct level at intervals directed by compressor manufacturer. Clean oil screens and crankcase breathers at drain periods.

FROM THE LARGEST stationary units to the smallest portables, thousands of compressors are operating with carbon-free valves, lubricated with *Texaco Alcaid, Algol or Ursa Oils*.

YOU can keep your air compressors operating continuously at full rated capacity . . . with valves opening wide and shutting pressure-tight . . . when you use *Texaco Alcaid, Algol or Ursa Oils*.

These Texaco oils are highly resistant to gum, sludge and carbon formation. Their use assures free rings, active valves, open ports, clean air lines.

The outstanding performance that has made Texaco preferred in the fields listed in the panel has made it preferred on prominent construction jobs throughout the country.

These Texaco users enjoy many benefits that can also be yours. A Texaco Lubrication Engineer will gladly cooperate . . . just phone the nearest of more than 2300 Texaco distributing points in the 48 States or write to:

The Texas Company, 135 East 42nd Street,
New York, N. Y.

THEY PREFER TEXACO

- ★ More stationary Diesel horsepower in the U. S. is lubricated with Texaco than with any other brand.
- ★ More Diesel horsepower on streamlined trains in the U. S. is lubricated with Texaco than with all other brands combined.
- ★ More locomotives and cars in the U. S. are lubricated with Texaco than with any other brand.
- ★ More revenue airline miles in the U. S. are flown with Texaco than with any other brand.
- ★ More buses, more bus lines and more bus-miles are lubricated with Texaco than with any other brand.

Care for your Car
for your Country



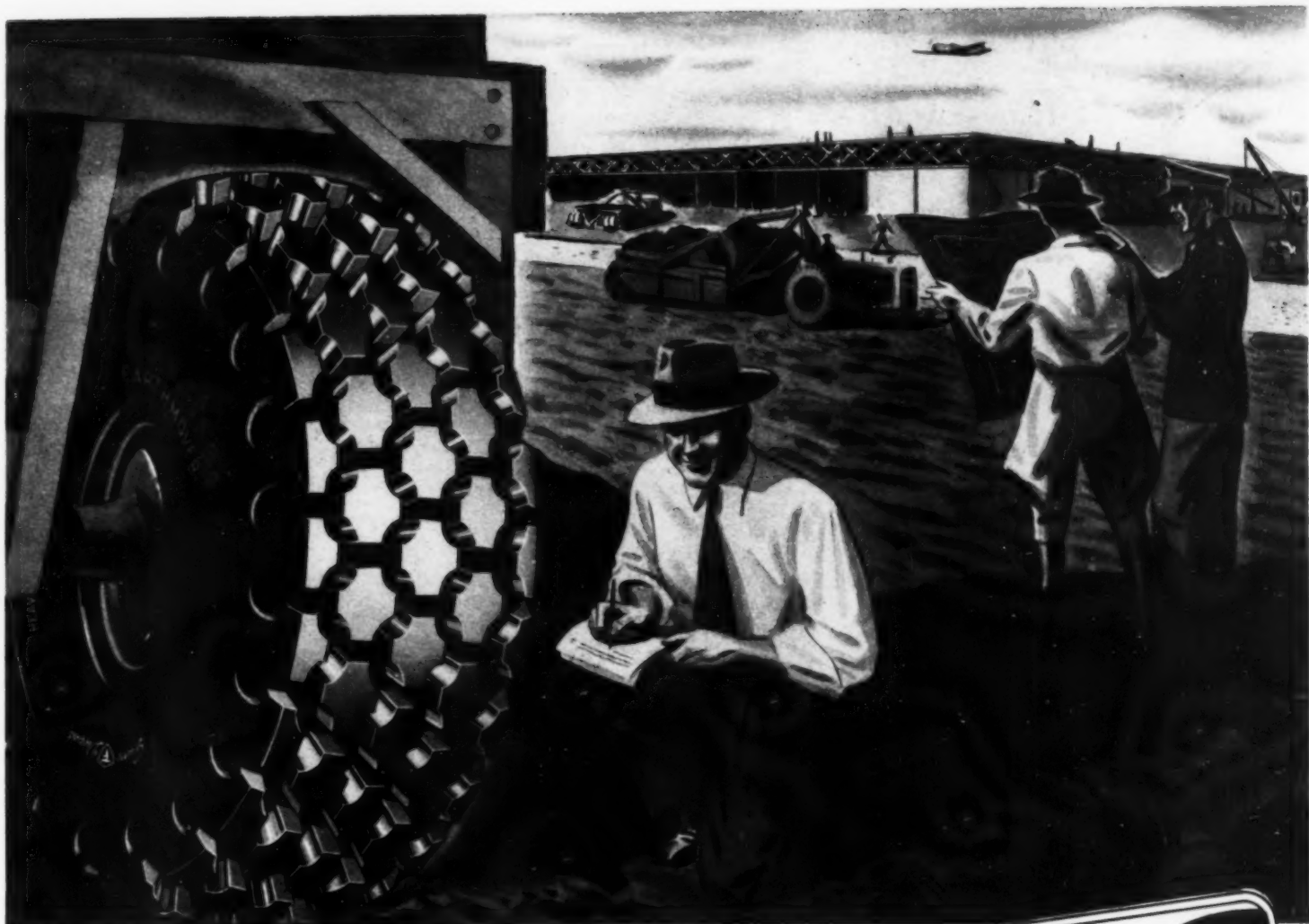
Tune in the TEXACO STAR THEATRE
every Sunday night—CBS



TEXACO Lubricants and Fuels

FOR ALL CONTRACTORS' EQUIPMENT

HELP WIN THE WAR BY RETURNING EMPTY DRUMS PROMPTLY



Whatever the job LET A FIRESTONE TIRE SPECIALIST HELP YOU PRODUCE *Extra Service*

NATURALLY, you are taking steps to obtain every possible hour of service from your earth-mover tires. But, in addition to your own efforts, you can actually secure thousands of extra hours of service from these tires by following the suggestions of your nearby Firestone tire specialist. He will analyze your earth-moving equipment from a tire life standpoint and:

- ★ Report on tire abuses that are causing premature wear.
- ★ Recommend treading and repairing where necessary.
- ★ Advise on which wheels treaded and repaired tires should be used.
- ★ Examine tires removed from service for evidence that may show how to make your tires last longer.

- ★ Assist your tire service man in setting up a regular routine for earth-mover tire maintenance.

Your nearby Firestone Dealer or Firestone Store will arrange for a complete analysis of the tires on your earth-moving equipment by a Firestone truck tire engineer. Call today!

FOLLOW THE TIRE SAVING SUGGESTIONS IN THIS FREE BOOKLET

Send for this free booklet today. It tells you the proper tire to use on each type of earth-moving machinery and how to avoid the effects of over and under inflation, careless operating practices, mechanical defects and neglect of cuts and bruises.



GROUND GRIP EXCAVATOR

Provides increased resistance to tread cutting and sidewall snagging in earth hauling, quarry work, coal and ore strip mining and any operation where sharp rocks and stones are encountered.



ALL NON-SKID EARTH-MOVER

Designed for scrapers and trailer wagons. Low inflation pressures prevent impact breaks and provide maximum flotation and traction on rough terrain and in soft going.



ROCK GRIP EXCAVATOR

A widely-spaced chevron tread pattern provides greater traction and a cut-resisting tread with double-thick sidewalls provides greater strength for coal and ore strip-mining operations.



Firestone

MORE EARTH-MOVING MACHINERY IS EQUIPPED WITH FIRESTONE TIRES THAN WITH ANY OTHER MAKE

Listen to the Voice of Firestone with Richard Crooks, Margaret Speaks and the Firestone Symphony Orchestra, under the direction of Alfred Wallenstein, Monday evenings, over N.B.C. Red Network

The *Whiteman* "3-Step" Precision Method Adds 40% to your Present Crew's Concrete Laying and Finishing Capacity!

With the WHITEMAN Mechanized "3-Step" Precision Method your present crews can screed, float and finish concrete slabs in two-thirds the usual time. That's the record of many contractors who have increased the capacity of their crews 40% or more; have relieved critical labor shortages and have speeded vital war construction projects at lower cost!

Job-proved WHITEMAN Machines get uniformly high quality concrete, indoors or out. Use the WHITEMAN "3-Step" Precision Method on your next concrete slab job! Equipment needed isn't expensive, pays for itself on the job—and we can make prompt delivery!

The "3-Step" way places and finishes concrete faster — assures smoother longer life surfaces. For the name of your nearest dealer write us TODAY.

Step 1

SCREEDING — The WHITEMAN power operated Rodding Machine simultaneously levels and compacts the concrete while operated by one man. Experienced contractor-users report 4 cu. yd. of low-slump concrete can be handled in 5 minutes.

The two rod sticks (screeds) of the WHITEMAN machine ride the headers. Driven by the gasoline engine, the rod sticks make 5-inch transverse strokes — in opposite directions. During the power driven transverse movement, a steady pull forward by the operator provides a uniform rate of advance. This leaves a pour that has been compacted and leveled — ready, when sufficiently set, for Step 2.

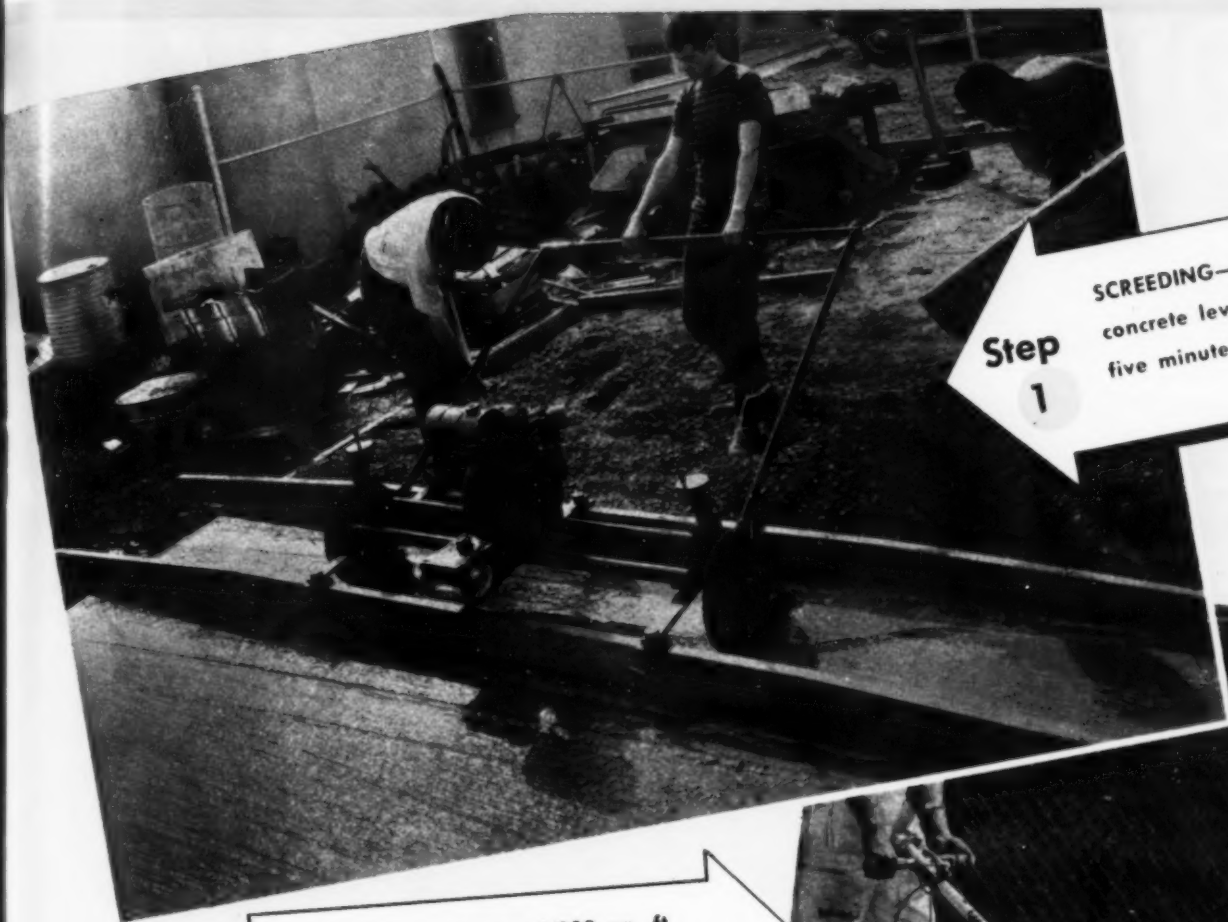
Step 2

FLOATING — When you are ready to float the slab, attach the "Heavi-Duti" FLOAT TROWELS (10" x 18", 12-gage steel) to your WHITEMAN Finishing Machine. As your machine moves over the pour it produces a perfect float finish at high speed with the strong, broad trowels, which rotate while lying flat on the concrete surface. WHITEMAN finishers, float-trowel equipped, will cover 1,000 sq. ft. in as little as 15 minutes. When the "floated" slab has set sufficiently it is ready for Step 3.

Step 3

FINISHING — Put the easily attached "FINISH" trowels on your WHITEMAN machine. These lighter, flexible and adjustable blades (6" x 18", 17-gage steel) bring up the surface in a hurry, leaving a finish far superior to hand work. WHITEMAN Finish Trowels give you a harder, denser surface, free of voids or laitance that costs less to finish, and wears longer.

Remember, too, only One Machine — the WHITEMAN Precision Finishing Machine (48" in diameter) — with two interchangeable sets of trowels, will do both floating and finishing jobs. You don't have to double your machine investment; you do double the work capacity.



Step
1

SCREEDING—4 cu. yd. of 1-in. slump concrete leveled and compacted in five minutes.

FLOATING—Will work 1,000 sq. ft. of heavy duty dry mix in less than 15 minutes. A dense mass is produced with a "fat" surface, ready for finishing.

Step
2



Step
3

FINISHING—Using the same WHITE-MAN machine as for floating, attach adjustable finishing trowels; 1,000 sq. ft. is brought up in 15 minutes to a hard, dense surface free of voids and laitance.

Whiteman **MANUFACTURING CO.**

3249 Casitas Avenue

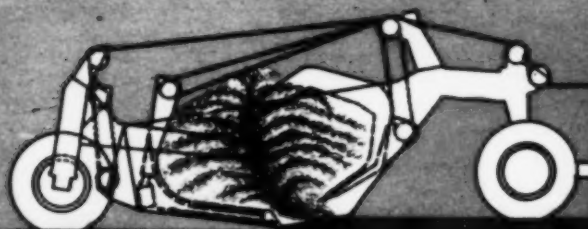
Los Angeles, California

THE DIRT "BOILS"

FOR FAST LOADING

Bucyrus-Erie
4 WHEEL SCRAPERS

DIRT ENTERS IN VERTICAL COLUMN



This diagram of the "boiling" action shows how the dirt flows evenly into both apron and bowl by the shortest possible route.

Bucyrus-Erie Scrapers load fast and in short distances because the cutting edge is double-curved (curved both vertically and horizontally) to "boil" the dirt up easily into both apron and bowl.

The **vertical curve** "curves" the dirt upward, just as the moldboard on a plow does. The dirt, entering in a vertical column, rises up through the load until it rolls out on top. Thus, you get maximum effectiveness from tractor power, because the last dirt entering the scraper doesn't have to push and pack the whole load in order to get in.

The **horizontal curve**, like the round point on a hand shovel, makes penetration easy and rolls the dirt inward toward the center

of the bowl. This "rolling inward" action provides easy loading by reducing sidewall friction.

This two-way rolling action breaks up the dirt as it enters the bowl so that the scraper fills evenly with minimum voids, to give heaping payloads every time. The broken up dirt also rolls out easily for fast, free-flowing ejection. — BUCYRUS-ERIE COMPANY, South Milwaukee, Wisconsin.

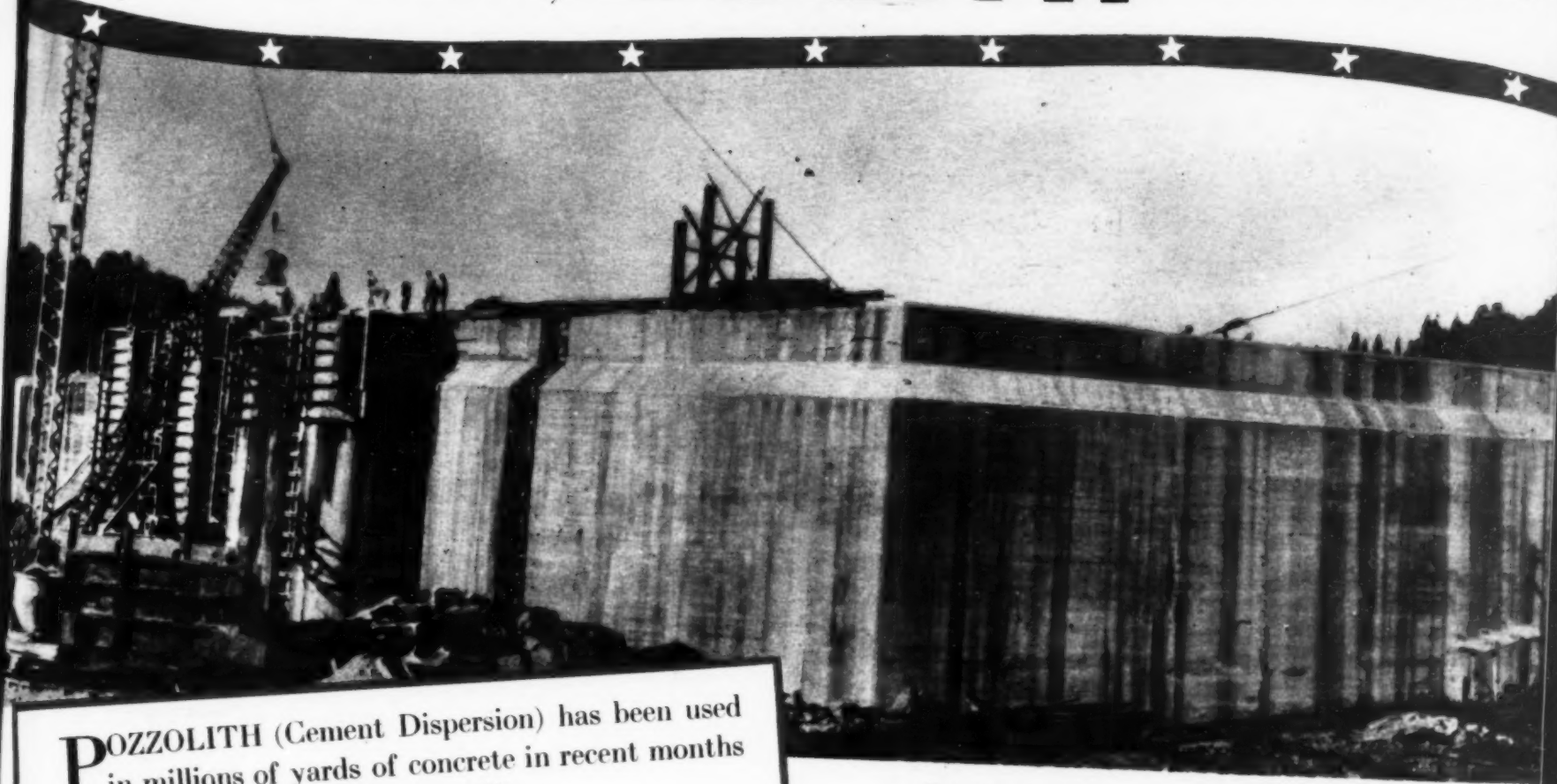


**BUCYRUS
ERIE**
TRACTOR EQUIPMENT

INTERNATIONAL TRACTRACTOR

Speed and Durability

WITH **POZZOLITH** (CEMENT DISPERSION)



POZZOLITH (Cement Dispersion) has been used in millions of yards of concrete in recent months to gain greater speed and durability.

Because Cement Dispersion utilizes more of the cement, speed of construction can be increased by reducing heat evolution and adding durability through reduced cracking.

In addition to the important advantages of greater speed and durability, Cement Dispersion produces easier workability, faster placeability and greater watertightness.

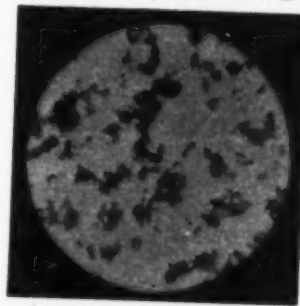
Every engineer will find Research Paper No. 36—"Economics of Cement Dispersion" interesting and valuable. Write for a copy today.

THE MASTER BUILDERS COMPANY, LTD.
TORONTO

In the U.S.A.: The Master Builders Company, Cleveland, Ohio

Greater construction speed and durability were important factors in the decision to use Pozzolith throughout this great power dam, located in Canada. Contractors—The Foundation Company, Ltd., Montreal, Quebec.

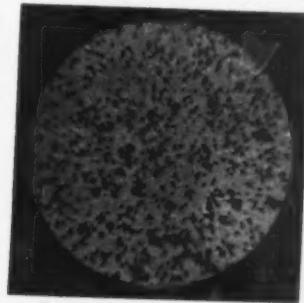
HOW CEMENT DISPERSION WORKS



Cement suspended in water
UNDISPERSED

WITHOUT POZZOLITH

In a normal concrete mix, cement particles tend to bunch together, thereby (1) limiting hydration and (2) trapping water within the cement clumps. (See photomicrograph above).



Cement suspended in water
DISPERSED

WITH POZZOLITH

Cement Dispersion drives these particles apart and (1) exposes their entire surface area to hydration, at the same time (2) making the water entrapped in the clumps available for lubrication of the mix. (See photomicrograph above).

MASTER BUILDERS



An east-coast ship-model testing basin where Athey Trailers, pulled by "Caterpillar" Diesels, haul rocky material over rough going without delay.

WORKING AGAINST TIME?

Play It Safe . . . Use
Your Weather-Defying
Athey Trailers On
Every Tough Job



Big, Sharp Rocks for Footing—Heavy-duty, steel tracks roll over rocks, hauling extra-capacity loads to the fill. Contractors today use Athey Trailers wherever poor footing threatens job progress.

ATHEY Forged-Trak Trailers needn't be pampered in bad weather or tough footing. They keep the work rolling even under poorest conditions.

That's why contractors are taking fullest advantage of their Athey equipment today when delays mean more than lost dollars — lost lives! For every hauling job where you run the chance of muddy or rocky going, grades, or poor weather, don't take chances . . . use your rugged, sure-footed, all-weather Athey Trailers. They're your job insurance for getting big loads hauled, seeing every job through, regardless of materials, footing or season.

Another thing, the need for constructing and "keeping up" haul roads is eliminated, thus, giving you a saving in time and a conservation of motor graders and maintenance equipment

vitaly-needed elsewhere. Your output is steady because Athey tracks give uniform performance under any, and all hauling conditions. And you don't have to be afraid of sharp, jagged rocks with these sturdy, steel-track units.

The same type of Athey equipment that you operate is handling extra-tough hauling jobs for Uncle Sam's forces on far-away battle fronts and nearby defense fronts. It's chosen because it delivers the goods.

If your Athey equipment needs servicing, keep it in shape — use the service facilities your Athey-"Caterpillar" Dealer offers. He has specialized tools and equipment, skilled servicemen and experience to give you fast, expert attention. He has genuine replacement parts. See him for every repair or maintenance need.

WAR BONDS PROTECT YOUR, AND AMERICA'S, FUTURE!

ATHEY

TRUSS WHEEL CO. • CHICAGO, ILLINOIS



IDLE TRACTORS WIN NO WARS

ALL "Caterpillar" production is now being sent to the war fronts. But there are thousands of existing "Caterpillar" Diesel Tractors combining millions of unused working hours which are still available for war-winning aid on the home fronts: For raising food for our embattled selves and Allies. For construction projects to speed the flow of ships, tanks, planes, guns and supplies. For maintaining essential highway and transportation systems. For necessary municipal street maintenance and sanitary requirements. For helping to sustain the economic structure of the nation in general.

Keep 'em fighting!

Keep your "Caterpillar" Diesel Tractors doing useful work. Through proved design and precision manufacture, these mobile power-plants have fundamental soundness and long-time productive capacity built into them. And even though many of them may have already delivered thousands of hours of work, a little

mechanical service or a few parts replacements will usually refit the most savagely used machine to deliver still more.

"Caterpillar" dealers are helping to get the utmost out of "Caterpillar" equipment. With replacement parts and service facilities, your dealer is part of a world-wide system of "bases" for keeping the far-flung fleets of "Caterpillar" Diesels going. But he is more than a "ground crew" for repairs. He is headquarters for aid in other directions. His knowledge of earth-moving, site-clearing, soil-preparing, lumbering, quarrying, equipment-moving, and similar heavy operations, enables him to render helpful advice . . . on how to save operating costs — the best way to get the job done.



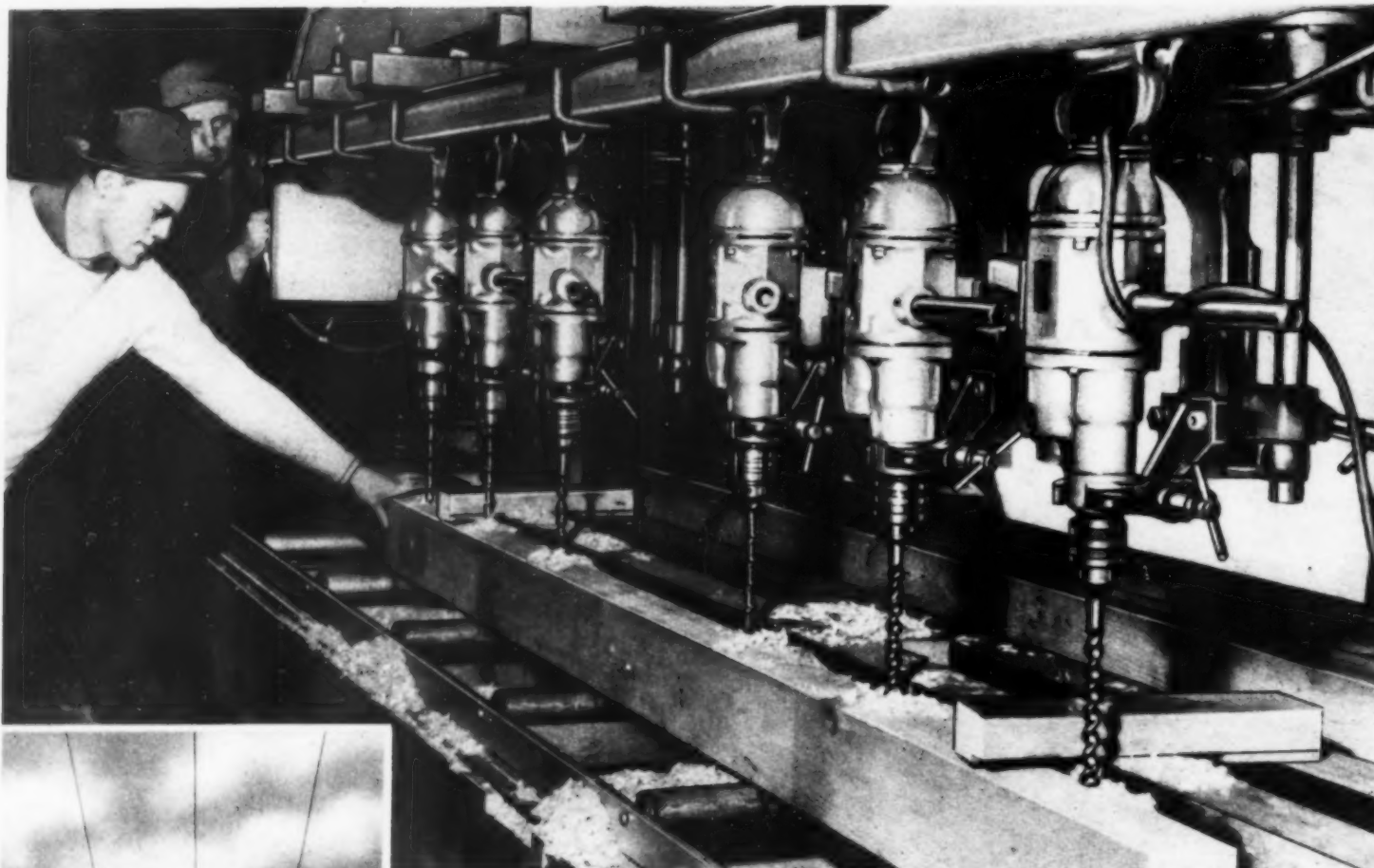
GOOD CARE PAYS —Keep your "Caterpillar" Diesel Tractor fit to fight:

- 1 Keep air cleaner clean.
- 2 Keep the filters working.
- 3 Keep clutches in proper adjustment.
- 4 Watch the tracks — turn pins and bushings at intervals to lengthen their life.
- 5 Keep valve-clearance exactly right.
- 6 Use correct lubricants and change them regularly — when "worn" and to fit the climate.
- 7 Replace broken or worn-out parts — at once.
- 8 Make use of the service your "Caterpillar" dealer can render.

CATERPILLAR DIESEL

REG. U.S. PAT. OFF.
CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS

TO WIN THE WAR: WORK—FIGHT—BUY WAR SAVINGS BONDS!



Photos courtesy the American Lumber Treating Company

Black & Decker Drills "GANG-UP" to Rush Power for War Jobs

Six Black & Decker Heavy Duty Drills Bore 420 Holes an Hour in Power Line Cross-Arms!

The Wauna Lumber Company at Wauna, Oregon, got an order for several carloads of Wolmanized cross-arms for power lines of the Portland General Electric Company and the Bonneville Power Administration. It was a trial order. It meant a fast, accurate drilling job — and the company had no cross-arm drilling machine. What to do?

Planing-mill foreman, A. B. Taylor, solved this tough one — with Black & Decker Portable Electric Drills. He rigged a gang of six Black & Decker Heavy Duty Drills with $\frac{5}{8}$ " bits, set up a jig to hold the cross-arms on a conveyor, and in no time was turning out better than seventy accurately drilled cross-arms every hour. (The Wauna Company got more orders — thanks to Mr. Taylor's ingenuity — and Black & Decker Tools!)

This is one instance of the adaptability of Black & Decker Tools in speeding war construction jobs. Whatever your tooling problem — sawing or drilling . . . hammering or sanding . . . screw driving or nut running — get in touch with your Black & Decker Distributor. Or write to: The Black & Decker Mfg. Co., 759 Pennsylvania Ave., Towson, Md.

POWER FOR WAR. Cross-arms for these power lines are drilled at top speed by Wauna Lumber Company with Black & Decker Heavy Duty Drills.

CROSS-ARMS DRILLED AND READY for the Wolmanizing process by which Wauna Lumber Company protects them — makes them safe and clean for linemen to work on.



Free Handbooks To Help Speed Construction Jobs

Send for these free handbooks showing Black & Decker tool uses in construction work. They're packed with down-to-earth facts on speed operations.

☐ Saw Handbook

☐ General Tool Catalog

EXPERT HELP—QUICKLY

Your nearby Black & Decker Distributor will show you how others are getting jobs done faster. Get in touch with him for expert help.

LEADING DISTRIBUTORS EVERYWHERE SELL

Black & Decker

PORTABLE ELECTRIC TOOLS

WHEN you buy for today's emergency job, plan for tomorrow! If you have a Real Rock Shovel, any digging problem today or tomorrow is solved!

Northwests are built for the hardest job a shovel has to do—rock! Boom design is proved. No Welded Boom of Northwest design and construction has ever failed. The Northwest Dual Independent Crowd utilizes force other shovels waste for additional crowding force. It handles harder digging and more yards per hour. Heavy alloy cast steel bases and cast steel machinery side frames take the shocks of heavy digging and maintain shaft and bearing alignment against wear. The Cushion Clutch relieves all parts under power from overload. The "feather-touch" Clutch Control reduces day-end fatigue and permits higher output.

And there are other advantages we can't tell you about here. In handling today's emergency jobs, plan for the future and be ready for any condition. Let us tell you more about Northwest Shovels, Cranes and Draglines.

IF YOU HAVE A REAL ROCK SHOVEL -

*Tomorrow's
digging problem is
solved!*



NORTHWEST

NORTHWEST ENGINEERING COMPANY
1728 Siegel Bldg., 26 East Jackson Blvd., Chicago, Ill.

Remember—
if you have a have
Real Rock Shovel,
you'll never have to
worry about output
in dirt!

Because accidents interrupt output—
**Greater Safety means
Increased Production**
Imperative Today!

Every accident brings not only a measurable loss in man-power and man-hours—but often an equally serious loss in equipment-hours as well. And anything that reduces the effectiveness of America's production machinery is a vital concern today.

For this reason, the greater safety of Atlas Manasite Detonators becomes more important, more desirable than ever.

Atlas Manasite Detonators offer greater resistance to impact and friction—an added margin of safety in case of inadver-

tent mishandling. While no blasting cap can be called "safe," Atlas Manasite Detonators make safety precautions not less important—but more effective.

Furthermore, the adoption of Atlas Manasite Detonators requires no time-consuming changes in operating technique. And since they cost no more, you get more for your money.

In these days, the real question is—
Can you afford *not* to use Atlas Manasite Detonators?

MANASITE—Reg. U. S. Pat. Off.

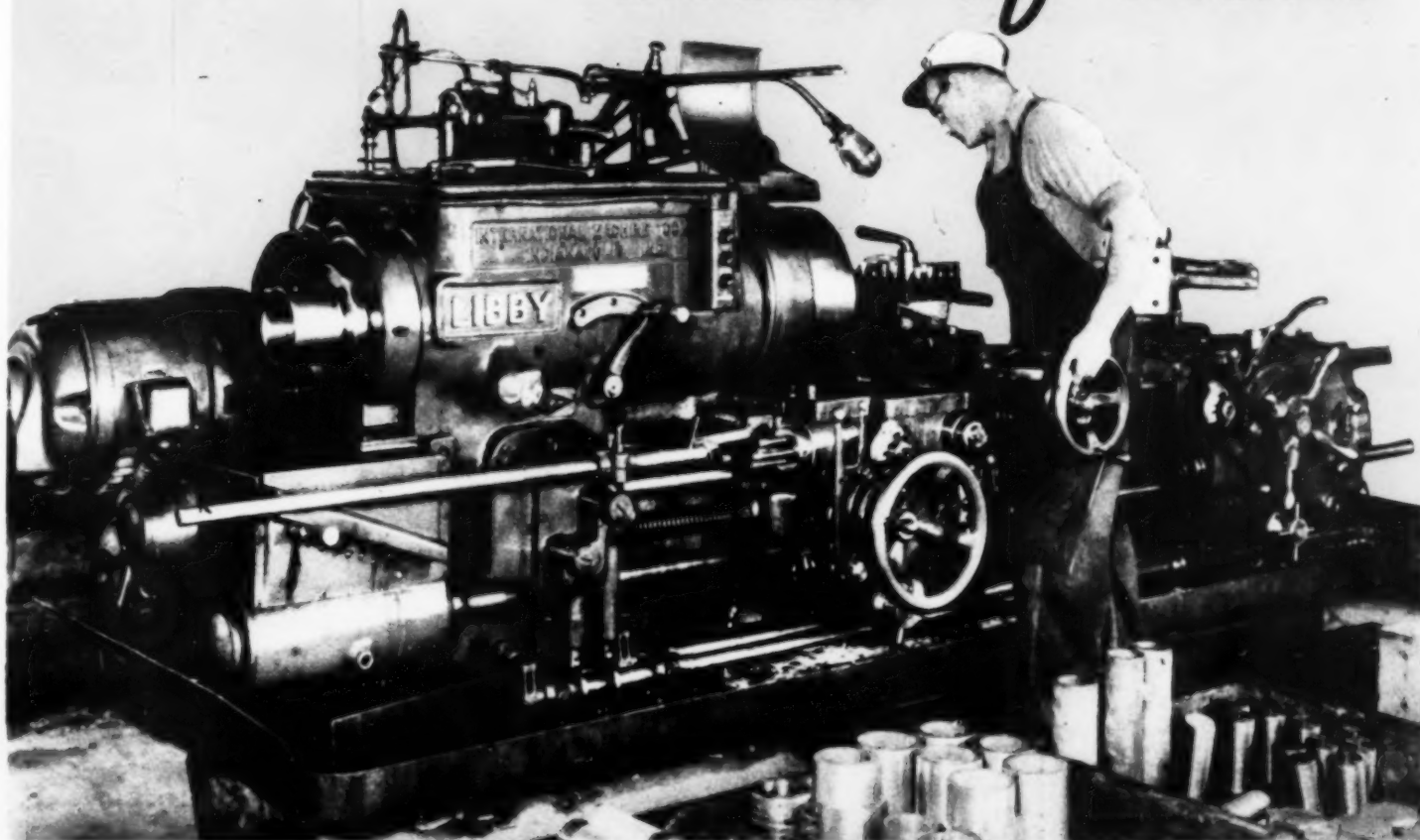
**ATLAS
MANASITE
DETONATORS**
FOR GREATER
SAFETY

ATLAS EXPLOSIVES
"Everything for Blasting"



ATLAS POWDER COMPANY, Wilmington, Del. • Offices in principal cities • Cable Address—Atpowco

Not up with the times— *ahead of them!*



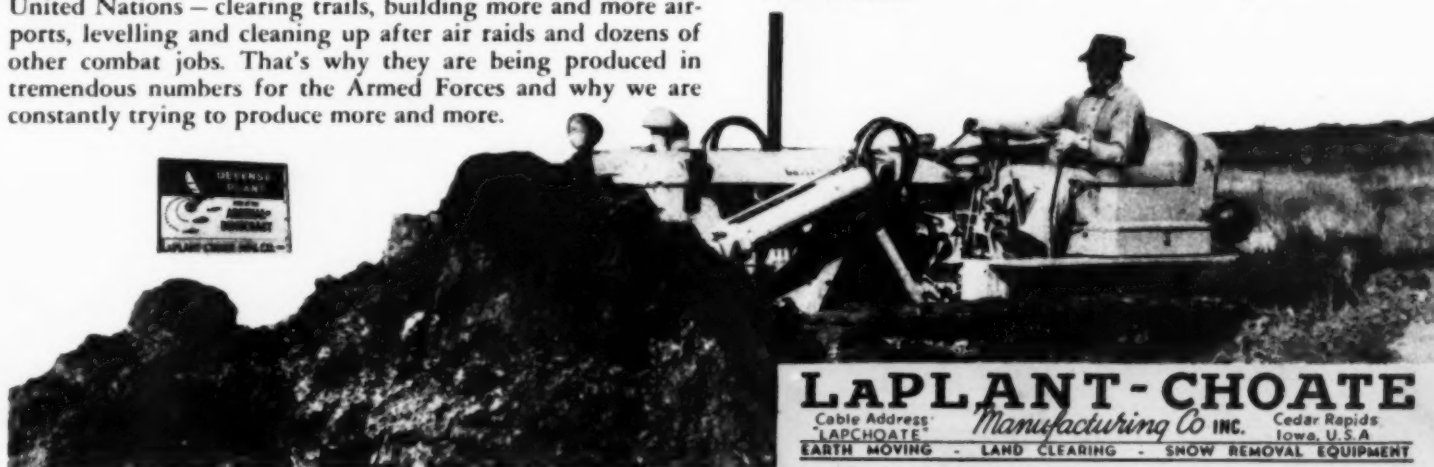
● LAPLANT-CHOATE dealers have always prided themselves on being ahead of the parade. To you, as an owner, that leadership is more important than ever before. You are more interested in keeping your present equipment moving than you have ever been and your very livelihood depends on your ability to do so. That means you depend on your dealer for parts and service. Remember, he keeps a staff of factory-trained, skilled workmen who can repair your machines faster and better than they could be repaired any other way. Take advantage of their years of experience to keep your equipment rolling!

You know the importance of the jobs your equipment is doing. Your LaPlant-Choate tools and those of hundreds of other owners are busy building strategic roads, airports, industrial sites, army camps and many other military and civil projects. These same tools are working on the frontiers of the United Nations—clearing trails, building more and more airports, levelling and cleaning up after air raids and dozens of other combat jobs. That's why they are being produced in tremendous numbers for the Armed Forces and why we are constantly trying to produce more and more.

Even at top speed we can't produce as many as you'd like—but we'll keep on trying. In the meantime—your dealer can help you keep your present machines running at top efficiency.

We're trying to keep ahead of the times here at the factory, too. We're putting every ounce of effort possible into the building of fine machines today—but, we are also thinking of your future and ours. When tomorrow comes, we want to be able to give you even better LaPlant-Choate equipment. That's why our research and engineering department crowds extra hours into these busy days—planning for the tools of tomorrow. As today, they will be built of the best materials available—they will be built to tried and proved design and they will be built by skilled American workmen, who take pride in their ability to build the best machines that can be built!

You'll always buy dependability when you buy LaPlant-Choate tools!



LAPLANT-CHOATE

Cable Address: LAPCHOATE Manufacturing Co. INC. Cedar Rapids, Iowa, U.S.A.
EARTH MOVING - LAND CLEARING - SNOW REMOVAL EQUIPMENT



THE GALION IRON WORKS &

Main Office and Works . . .

Galio

GALION

ROLLERS AND GRADERS

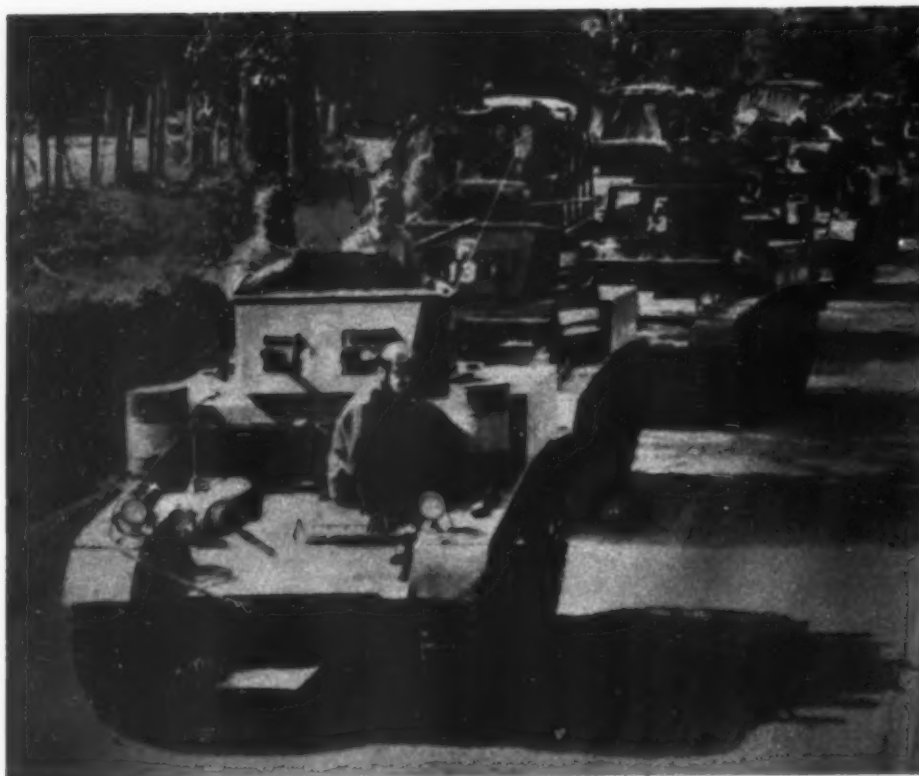
In the present crisis war construction jobs must be rushed to completion . . . equipment must keep going day after day, 24 hours a day if necessary. A major step toward this goal is a wider use of modern road building and maintenance machinery . . . the kind that Galion builds.

There is a Galion Distributor near you . . . he can help you extend the life of your present Galion machines.

RK & MFG. CO.

Galion, Ohio





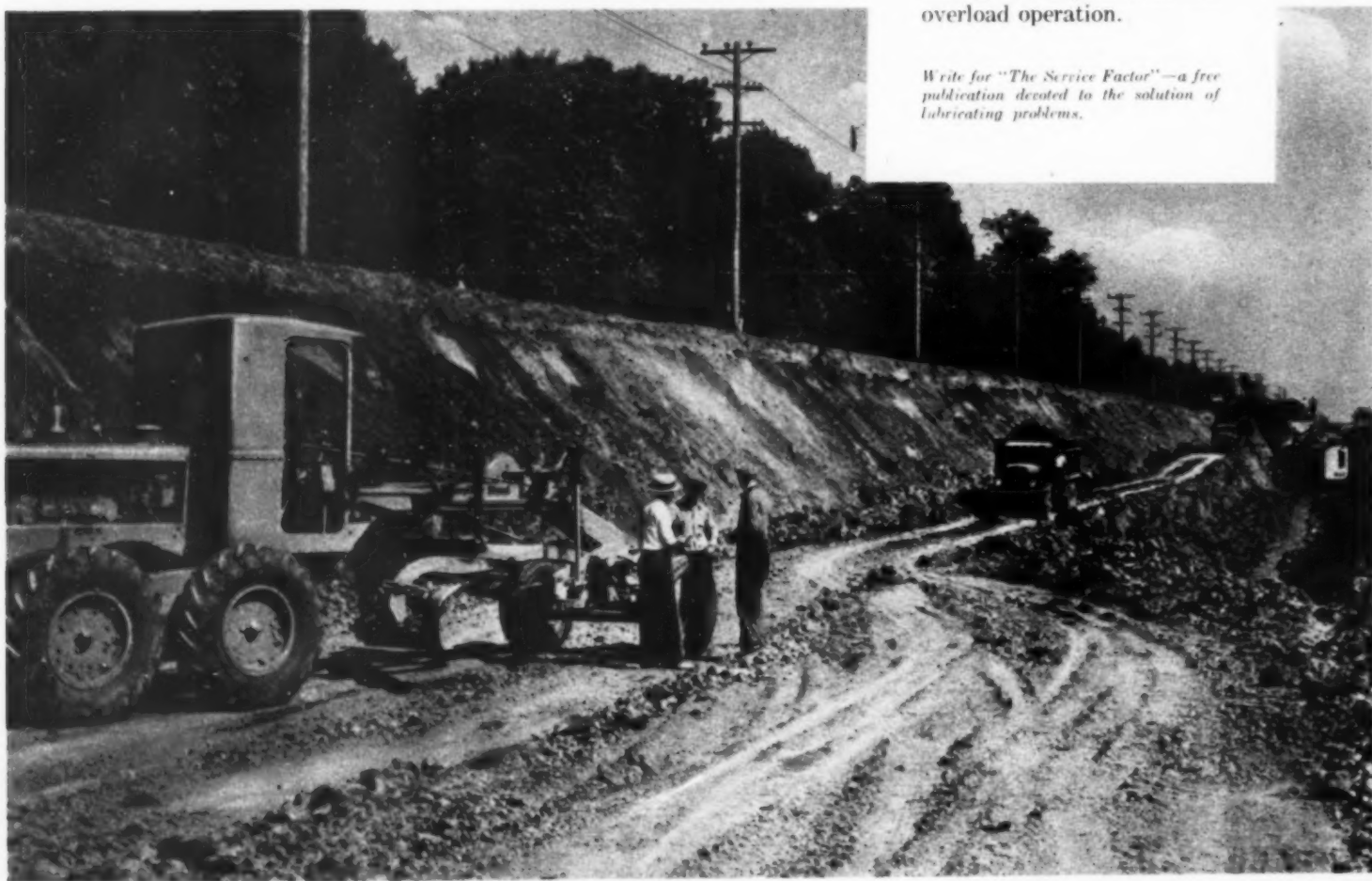
POWER TO WIN

depends on power to construct. For stepped-up productive hours from **CONSTRUCTION MACHINERY** use . . .

...SINCLAIR PENNSYLVANIA and OPA-LINE MOTOR OILS.

These lubricants and Sinclair specialized gear oils and greases safely cushion the hard grind of peak load and overload operation.

Write for "The Service Factor"—a free publication devoted to the solution of lubricating problems.



SINCLAIR LUBRICANTS-FUELS

FOR FULL INFORMATION OR LUBRICATION COUNSEL WRITE NEAREST SINCLAIR OFFICE

SINCLAIR REFINING COMPANY (Inc.)

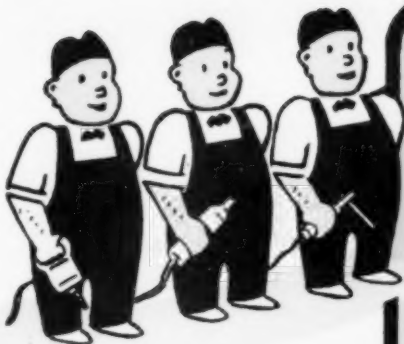
2540 WEST CERMAK ROAD
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Use LeTourneau - "Caterpillar" ONE-STOP SERVICE FOR VICTORY

Take Advantage of This Complete Parts and Repair Service
to Keep Your Tractors and Tractor-Drawn Equipment Operating
at Peak Efficiency

Now more than ever America needs speed in constructing war factories, airports, shipyards and bases. Your earthmoving equipment is vital to this effort. To help you keep it operating night and day LeTourneau "Caterpillar" distributors, already rated as the world's best equipment service organization, have increased their facilities — now offer you 7 Star One-Stop Service. Use it to keep your tractors and tractor-drawn equipment moving bigger yardages quicker and cheaper — for Victory. Call your nearest LeTourneau "Caterpillar" dealer — he's listed below.

ALABAMA
Burford-Toothaker Tractor Company, Montgomery.
J. D. Pittman Tractor Co., Inc., Birmingham, Decatur.

ARIZONA
Ben Hulise Tractor & Equipment Co., Yuma.
State Tractor & Equipment Co., Phoenix, Buckeye, Coolidge, Mesa.

ARKANSAS
J. A. Riggs Tractor Co., Little Rock, West Memphis.

CALIFORNIA
Berglund Tractor & Equipment Co., Napa, Dixon, Rio Vista, Santa Rosa.
Brizard Tractor & Equipment Co., Arcata.
Budd & Quinn, Fresno, Madera.
Cornell Tractor Co., Salinas, Watsonville, King City.
Cousins Tractor Company, The, Hanford, Bakersfield, Wasco.
Halton-Treanor, Inc., Visalia, Porterville, Tulare.
Holt Brothers, Stockton, Lodi.
Ben Hulise Tractor & Equip. Co., El Centro, Brawley.
Johnson Tractor Company, Riverside, Coachella, Ontario, Colton.
Marysville Tractor & Equip. Co., Marysville, Roseville.
Joseph G. Moore Company, Santa Maria, Paso Robles, Goleta, Lompoc.
Peterson Tractor & Equipment Company, Hayward, San Francisco, Brentwood.
Rye Tractor & Equipment Company, San Jose, Hollister.
San Diego Tractor & Equipment Company, San Diego, Escondido.
Shepherd Tractor & Equipment Company, Los Angeles, Oxnard, Covina, Santa Ana.
Sierra Tractor & Equipment Company, Chico, Gridley, Redding, Red Bluff.
Valley Tractor & Equipment Company, Modesto, Los Banos, Merced.
Weaver Tractor Company, Sacramento, Woodland.
I. G. Zumwalt Company, Colusa, Willows.

COLORADO
Clinton & Held Company, Denver.

CONNECTICUT
The Nicoll-Talcott Corporation, Hartford.

FLORIDA
Burgman Tractor—Equipment Co., Jacksonville.
Clewis Motor Company, Clewis, Miami.

GEORGIA
Yancey Brothers, Inc., Atlanta.
Yancey Tractor Company, Albany.

IDAHO
Bunting Tractor Company, Boise, Twin Falls.
Nes Perce Tractor & Equipment Co., Lewiston.
Westmont Tractor & Equipment Company, Idaho Falls.

ILLINOIS
Central Illinois Tractor & Equip. Co., Springfield.
Fabick Tractor Company, Salem.
Patten Tractor & Equipment Company, Chicago.
Peoria Tractor & Equipment Company, Peoria.

INDIANA
Indiana Equipment Company, Inc., Indianapolis.

IOWA
Gibbs-Cook Tr. & Equip. Co., Des Moines, Mason City.
Martin-Ross Tractor & Equipment Co., Cedar Rapids.
Miller-Hasselbalch Company, Sioux City.

KANSAS
Karcher-Wolter-Foley Company, Wichita.
Martin Tractor Company, Topeka, Chanute.
Oehlert Tractor & Equipment Company, Salina, Colby.
Roberts Tractor & Equip. Co., Dodge City.

KENTUCKY
Roy C. Wayne Supply Company, Louisville, Paducah.

LOUISIANA
Louisiana Tractor & Mach. Co., Baton Rouge, Monroe.

MAINE
Eastern Tractor & Equipment Co., South Portland.

MARYLAND
Alban Tractor Company, Inc., Baltimore.

MASSACHUSETTS
P. I. Perkins Company, Boston.

MICHIGAN
Brebner-Sinz Machinery Company, Inc., Marquette.
Keller Tractor & Equip. Co., Detroit, Grand Rapids.

MINNESOTA
Wm. H. Ziegler Company, Inc., Minneapolis, Crookston, Duluth.

MISSISSIPPI
Mississippi Tractor & Equipment Co., Jackson.

MISSOURI
John Fabick Tr. Co., St. Louis, Sikeston.
Hobson-McFarland Tractor Company, Kansas City, St. Joseph, Trenton.
E. A. Martin Machinery Company, Joplin, Springfield.
Martin-Ross Tractor & Equipment Co., Hannibal.

MONTANA
Connelly Machinery Company, Billings, Great Falls.
Tractor & Equipment Company, Sidney.
Westmont Tractor & Equipment Co., Missoula.

NEBRASKA
Lincoln Road Equipment Company, Lincoln.
Miller-Hasselbalch Company, Omaha.
Nebraska Machinery Co., North Platte, Scottsbluff.

NEVADA
James Cashman, Las Vegas.
Sanford Tractor & Equipment Co., Reno, Elko, Lovelock.

NEW HAMPSHIRE
P. I. Perkins Company, West Lebanon.

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Smith Tractor & Equipment Company, Inc., Irvington.

NEW MEXICO
R. L. Harrison Company, Albuquerque.

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Vincent S. Jerry, Plattsburg.
H. O. Penn Machinery Company, New York, Poughkeepsie, Mineola.
T. Southworth Tractor & Machinery Company, Albany.
Syracuse Supply Company, Syracuse, Buffalo, Rochester.

NORTH CAROLINA
Carolina Tractor & Equip. Co., Salisbury, Raleigh.

NORTH DAKOTA
Dakota Tractor & Equip. Co., Fargo.

OHIO
Taylor Tractor Company, Inc., The, Columbus, Garrettsville.

OKLAHOMA
Southwest Machinery Company, Oklahoma City, Tulsa.

OREGON
Braden-Bell Tractor & Equipment Co., Pendleton, Athena, Heppner, Arlington.
Bunting Tractor Company, La Grande.
Interstate Tr. & Equip. Co., Portland.
Reed Tractor & Equipment Company, Klamath Falls.

PENNSYLVANIA
Beckwith Machinery Company, Pittsburgh, Bradford, Harrisburg, Wilkes-Barre.
Giles & Ransome, Philadelphia.

SOUTH CAROLINA
Jeff Hunt Road Mach. Co., Columbia, Moncks Corner.

SOUTH DAKOTA
Western Material Company, Sioux Falls, Rapid City.

TENNESSEE
R. L. Harris, Inc., Knoxville, Chattanooga.
McCarthy, Jones & Woodard Company, Inc., Nashville.
Taylor-Hale Machinery Company, Memphis.

TEXAS
R. B. George Machinery Company, Dallas, Amarillo, Abilene, Lubbock.
Gulf Tractor & Equipment Company, Houston.
Wm. K. Holt Machinery Company, San Antonio, Weslaco, Corpus Christi.
Tri-State Equipment Co., El Paso.

UTAH
Landon Tractor & Equipment Company, Salt Lake City.

VIRGINIA
Virginia Tractor Company, Inc., Richmond, Roanoke.

WASHINGTON
Braden-Bell Tractor & Equipment Company, Walla Walla.
Hofius-Ferris Equipment Company, Spokane.
Northern Commercial Company, Seattle.
Webb Tractor & Equipment Company, Yakima, Wenatchee, Connell, Waterville, Ellensburg.
Western Tractor & Equipment Company, Seattle.

WEST VIRGINIA
West Virginia Tractor & Equipment Co., Charleston, Clarksburg.

WISCONSIN
Brebner-Sinz Machinery Company, Inc., Green Bay.
Nagle-Hart Tractor & Equipment Company, Madison.
Milwaukee, Eau Claire, Superior.

WYOMING
Wortham Machinery Company, Cheyenne, Sheridan, Greybull.

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Northern Commercial Company, Fairbanks, Anchorage, Nome.

HAWAII
Theo. H. Davies & Co., Ltd., Honolulu, Hilo, T.H.

All These Facilities Yours with One Stop

GENUINE PARTS QUICKLY—Factory-made LeTourneau and "Caterpillar" parts, Scraper blades, Dozer blades and end bits, Rooter shanks and shoes—carried in dealer stocks to serve you with a minimum delay.

PREFORMED TOURNAROE — Made by LeTourneau especially for cable-operated, tractor-drawn equipment. Standard for original and replacement use on LeTourneau equipment.

TOURNARWELD ELECTRODES — More than 8,000,000 pounds of this welding rod have been used in the past 3 years in the manufacture of LeTourneau equipment. Types and sizes to fill every field repair need.

SHOP & FIELD SERVICE FACILITIES—Many LeTourneau "Caterpillar" dealers are equipped with portable welding outfits, track pin presses and repair cranes to provide quick complete service in the field. All have adequate shop facilities.

JOB PLANNING — Ask your LeTourneau "Caterpillar" dealer for job layout and estimating help, field engineering figures and facts, and time saving shortcuts.

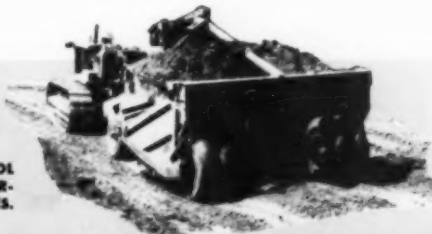
PROPER BEARINGS — LeTourneau selected and approved bearings for all LeTourneau units.

EXPERT SERVICE—Your LeTourneau "Caterpillar" dealer has a corps of experienced servicemen trained in efficient, time-saving repair practice. Traveling factory service schools keep them up-to-date on the newest methods.

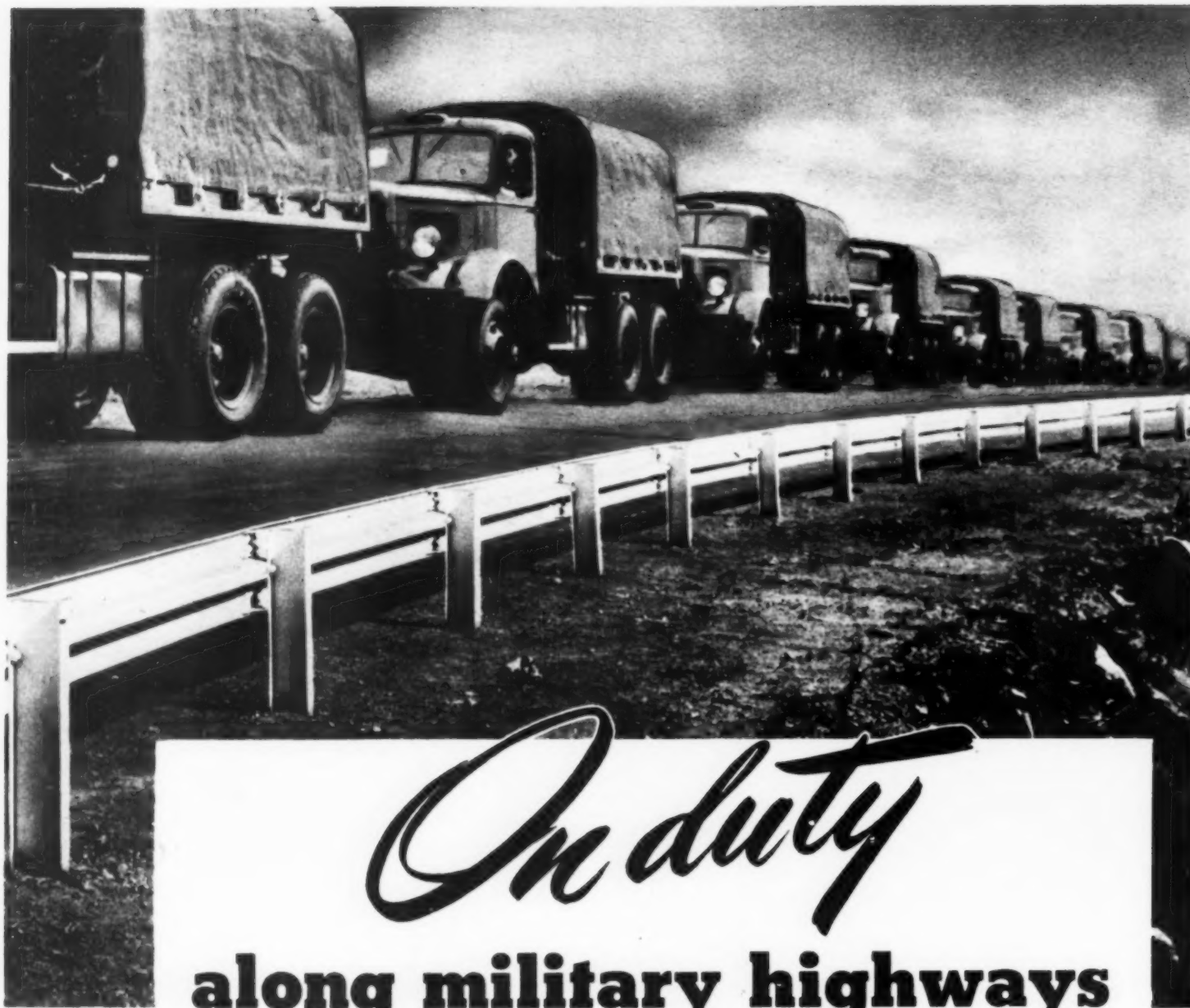


LETOURNEAU

Manufacturers of DOZERS, CARRYALLS, SCRAPERS, POWER CONTROL UNITS, ROOTERS*, SHEEP'S FOOT ROLLERS, TOURNAPULLS*, TOURNAROE*, TOURNATRAILERS*, TOURNARWELD*, TRACTOR CRANES.
*Name Reg. U. S. Pat. Off.



TO KEEP BOTH OLD AND NEW OPERATING PROFITABLY, USE LeTOURNEAU "CATERPILLAR" SERVICE



On duty **along military highways**

In the picture above, you see a Bethlehem Safety-Beam Guard Rail helping to assure safe transit for the U. S. Army convoy that's rolling by. This Safety-Beam makes an ideal guard rail because of its great strength, its ease of installation, and its high visibility. It's always easy to see, day or night.

Also shown are Bethlehem Steel Highway posts. Strong and readily driven, these posts, used with Safety-Beam Guard Rail, make a protective combination that's hard to beat.

Not visible in the picture, however, are other Bethlehem products that are also doing their part in speed-

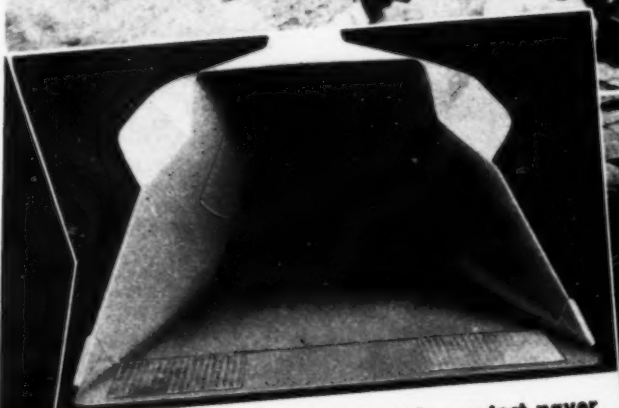
ing and protecting war-time traffic. Bethlehem Reinforcing Bars and Mats, embedded in the concrete roadway, are preventing cracks and disintegration, despite the continual heavy loads that move over the surface at high speeds. And Bethlehem Road Joints are there, too, adequately taking care of expansion and contraction of the pavement, transferring traffic loads from slab to slab, and keeping the riding surface even.

Bethlehem Highway Steel is helping to protect and keep serviceable many thousands of miles of America's highway network which has so important a part to play in the war effort.



BETHLEHEM STEEL COMPANY

LARGE SKIP AREA



Special baffle plates at skip sides protect paver and operator from cement sand and gravel.



Wide skip permits easy and quick spotting of loaded batch trucks.

EASY AND QUICK SPOTTING BATCH

High speed pouring requires high speed in every operation. Important operation in the batch cycle is the loading of the skip. Koehring Paver skips are large, streamlined, without corners, designed for flow-line charging, wide enough for easy entrance of batch truck tires. Skips have sufficient area to hold the maximum size batch without crowding. Heavy



Large skip area provides sufficient space, without crowding, for maximum batch.

plate construction with replaceable liners and tire tread plates assure a rigid unit for batch truck loading,

KOEHRING COMPANY
MILWAUKEE • WISCONSIN



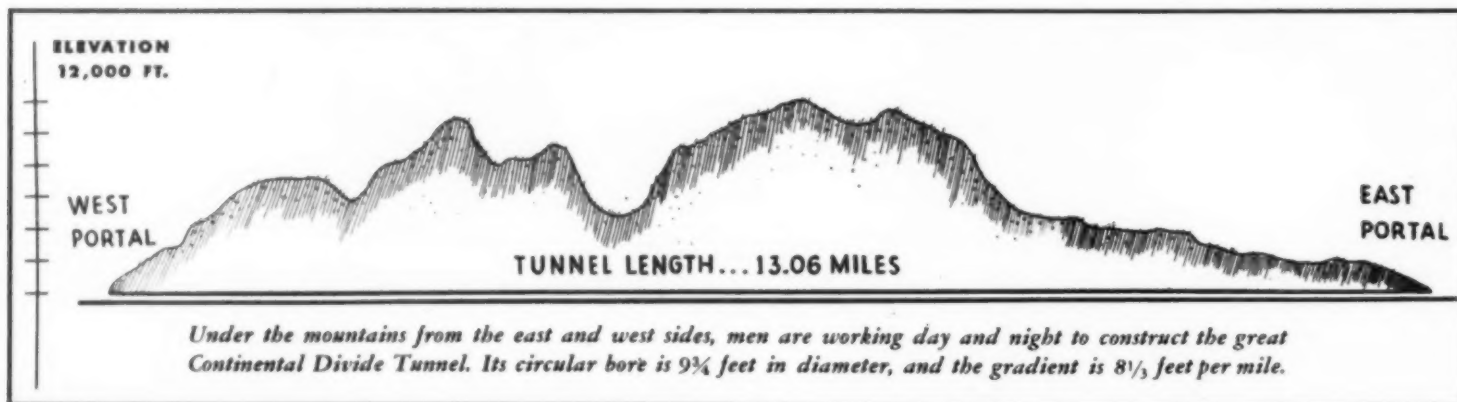
HEAVY-DUTY CONSTRUCTION EQUIPMENT



CONSTRUCTION

Continental Divide Tunnel 65% Completed...

DU PONT "GELEX"* AND DELAY ELECTRIC BLASTING CAPS PLAY IMPORTANT PART
IN DRIVING ONE OF LONGEST TUNNELS EVER BUILT WITHOUT SHAFTS



Loading lifter bores with "Gelex" No. 2 in the Granby Diversion Tunnel. Good water resistance of "Gelex", combined with excellent fragmentation and minimum noxious fumes make it satisfactory for use in place of the more expensive gelatins on many jobs of this type.

Seven thousand feet below the towering peaks of the Continental Divide a great tunnel, 13 miles long, is being driven through solid rock.

It will divert an average annual flow of 320,000 acre-feet of much needed irrigation water from a watershed on the western slope of the Rockies to fertile land on the eastern side. America, at war or at peace, will benefit from the increased acreage for crops and livestock... from power made available for development of lower-grade ores and industrial production.

This tunnel—now 65% completed—will require in all the drilling of over 3,000,000 feet of boreholes, removal of more than 800,000 tons of rock, and the use of over 2,000,000 pounds of dynamite. Yet, despite its magnitude, tunnel crews are making such excellent progress that the project will undoubtedly be completed ahead of schedule.

S. S. Magoffin, Inc. is driving

from the east portal, using Du Pont "Gelex" No. 1 and No. 2—two semi-gelatin dynamites ideal for this work because of their economy, good water resistance, minimum noxious fumes, and a high velocity of detonation that insures good fragmentation. This firm is also using Du Pont Delay Electric Blasting Caps exclusively on the job—over 190,000 having been shipped to date. At the western end, John Austin, of Carlton Tunnel fame, is in charge for Stiers Bros. Construction Co.

On another phase of this project—the Granby Dam Diversion Tunnel—Platt Rogers, Inc. has done a masterful job in winter temperatures of 40° below zero and lower. Here, again, Du Pont "Gelex" No. 2 is the blasting agent and Du Pont Delay Electric Blasting Caps are used exclusively for its detonation. *Trade Mark

Information for contractors
about Du Pont Explosives,
"Ventube" and "CZC"

HOW TO STORE "VENTUBE" FOR LONG LIFE

You can assure the greatest possible life from "Ventube" by proper storage methods when it is not in use. All "Ventube" should first be cleaned both inside and outside with clear water, and hung up to dry thoroughly. Then it should be folded carefully into a neat bundle. Wrinkles and creases should be avoided.

"Ventube" should be stored in a cool, dry place away from sunlight and heat. Avoid the use of gasoline, naphtha or other cleaning agents containing solvents harmful to rubber. When these precautions are observed, the high-quality construction of "Ventube" will enable you to use and re-use it many times with excellent results.

DID YOU KNOW?

... THAT there is no such thing as dry rot? Dampness promotes decay, but wood can be either so wet or so dry that fungi will not attack it. For dependable protection against decay, specify treatment with "CZC".

... THAT the entire method of installing the "Ventube" system was developed by one of America's foremost mining engineers in his own mine?

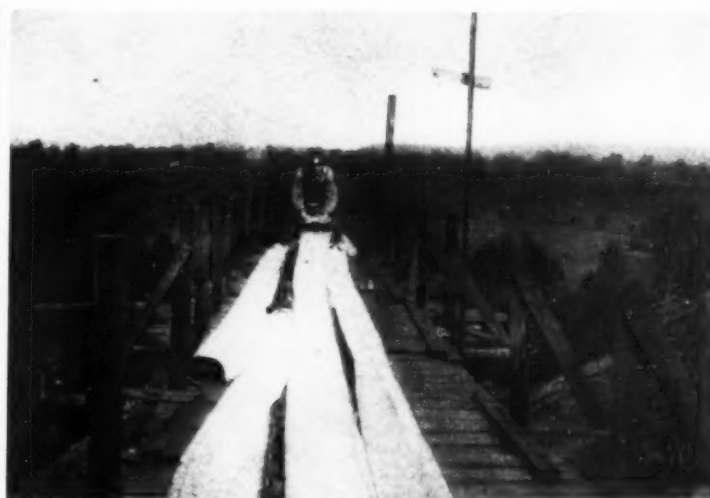
... THAT the Blasters' Handbook, published by Du Pont, is the only reference book of its kind issued in the United States.

Re-use of "Ventube" aids conservation

THIS PHOTO illustrates a big advantage of "Ventube" today when prevention of waste is a national need. It shows several sections of "Ventube" being rolled up to be kept for the next job. For "Ventube" is not a one-job product. It is the result of painstaking research to develop the most efficient type of fabric and the toughest impregnating and coating compounds.

To insure the life of the tubing under all operating conditions, the fabric has been chemically treated to resist heat, moisture, mildew and decay, acids, alkalis and gases.

As another aid to conservation, Du Pont has developed a special patching cement and cloth, which makes it easy to patch "Ventube" securely. If, by accident, you drill a hole through it or burn it with



an acetylene torch, the puncture can be repaired quickly and the "Ventube" put back in service immediately.

Proper storage also helps you get the most out of "Ventube," as explained in the article on this page. Further information

is contained in the new "Ventube" handbook. Copies are available from E. I. du Pont de Nemours & Co. (Inc.), "Fabrikoid" Division, Fairfield, Conn.

*"Ventube" is Du Pont's registered trade mark for its rubber impregnated flexible ventilating duct.

"CZC" treated lumber helps to conserve vital metals

More and more contractors today are solving priority problems by using "CZC" treated lumber to replace metal. Treated lumber cuts costs ... saves time in transportation and construction.

For "CZC" treated lumber has all the excellent properties of untreated lumber plus outstanding qualities of its own. "CZC" (Chromated Zinc Chloride) gives lumber dependable protection against decay, repels termites and

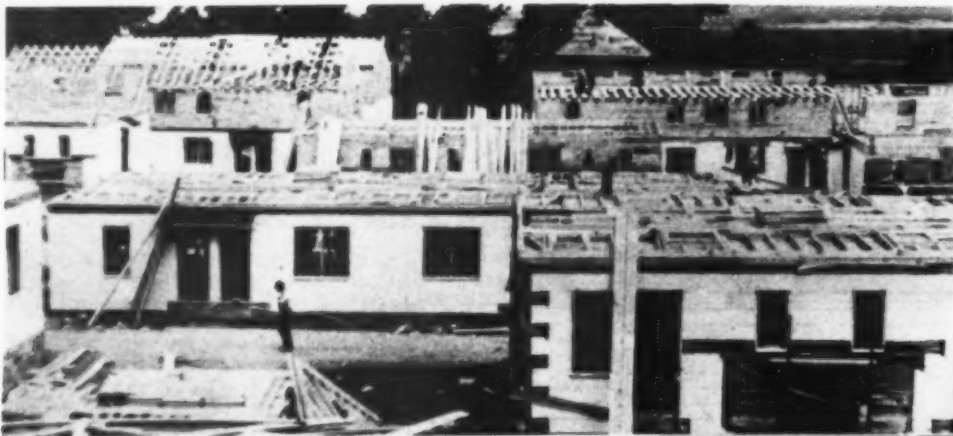
makes it fire resisting to a measurable degree.

"CZC" treatment permits the use of less expensive, less naturally durable woods which become more lasting when treated, than the better grades untreated. Properly treated wood suffers no loss

of strength—the same values for load and stress calculations are applied as designated for corresponding untreated wood.

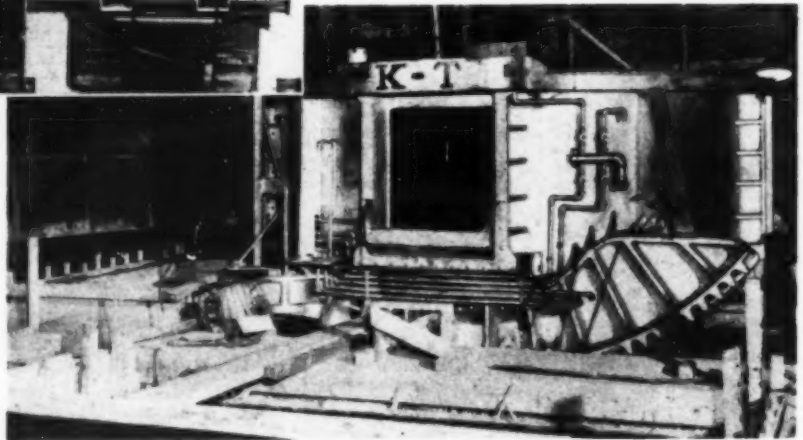
For further particulars on money-saving uses of "CZC" treated lumber, send for your copy of "Facts About Lumber Pressure Treated With Du Pont 'CZC'." E. I. du Pont de Nemours & Co. (Inc.), Grasselli Chemicals Department, Wilmington, Del.

★ E. I. DU PONT DE NEMOURS & COMPANY (INC.), WILMINGTON, DELAWARE ★

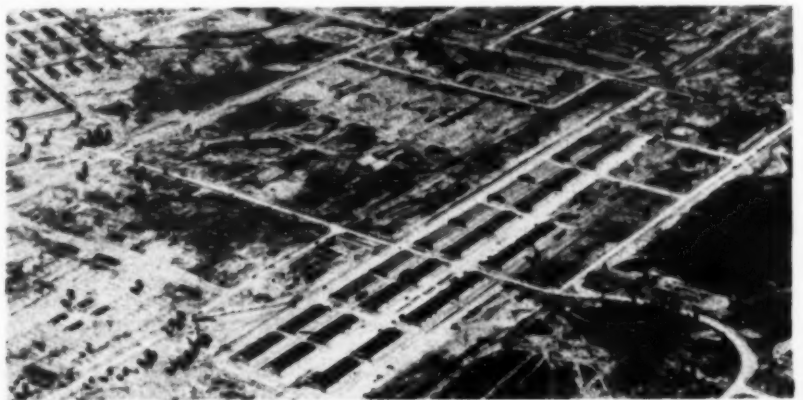


HOMES FOR WAR WORKERS: "Your Early Strength Cement," says the contractor, "was a great help in delivering more than 100,000 concrete blocks on time."

*Today's
"win-word"
is
SPEED!*



WAR PRODUCTION PLANTS: The concrete base for this new steel mill furnace was made with Lehigh Early Strength Cement in order to get into war production as fast as possible.



CAMP FOR SOLDIERS: Barracks foundations, roads, sewage disposal plant and other concrete construction were hastened to completion by Lehigh Early Strength Cement.

Camps for soldiers, plants and equipment for production, housing for workers! With Time the big factor in this war, it goes without saying that those engaged in such construction will want to use every device capable of saving time.

One of these most certainly is Lehigh Early Strength Cement. For it brings concrete to service strength as fast as concrete can be safely brought; actually 3 to 5 times as fast as normal cement can do it. By eliminating idle waiting time, by permitting continuous construction and

better coordination of the other trades, Lehigh Early Strength Cement has helped many a war project to get *quicker* into war production.

Shown here are only a few of the many types of enterprise in which Lehigh Early Strength Cement was utilized to speed up construction for the needs of war.


In all construction calling for concrete, let Lehigh Early Strength Cement do its time-saving stuff. You'll get quality concrete at the speed these times demand. For more information inquire of the Lehigh Service Department.

Lehigh

EARLY STRENGTH CEMENT

for service-strength concrete in a hurry

LEHIGH PORTLAND CEMENT COMPANY • ALLENTOWN, PA. • CHICAGO, ILL. • SPOKANE, WASH.



P & H

BUILT for tough war-time tasks!

Because:

- P&H is the only excavator with both upper and lower structures welded as single units to prevent "weaving" — more rigid.
- Rolled alloy steels throughout give them greater strength per pound of weight — to withstand continuous shock loads.
- Hydraulic control is faster, more positive. Simplifies operation; sets a new standard of performance.
- P&H's triple-safe, hydraulic boom hoist assures easier, more accurate handling of loads — less wear, less service.

It costs you less to have these — and other P&H advantages — than to be without them.



Awarded the Navy "E" for excellence in war production, P&H displays it also as a pledge of future effort.



More FOR YOUR EXCAVATOR DOLLAR

General Offices: 4494 West National Avenue, Milwaukee, Wisconsin

HARNISCHFEGER CORPORATION

EXCAVATORS • ELECTRIC CRANES • ARC WELDERS



HOISTS • WELDING ELECTRODES • MOTORS

This is no time to guess about tires

THE rubber situation is critical today. What it will be tomorrow, nobody knows.

So if you need tires now, and are privileged to buy them, don't be satisfied with anything but the best.

According to big construction contractors, that means Goodyears. For more than twenty years these tire-wise men have used more Goodyear tires than any other kind.

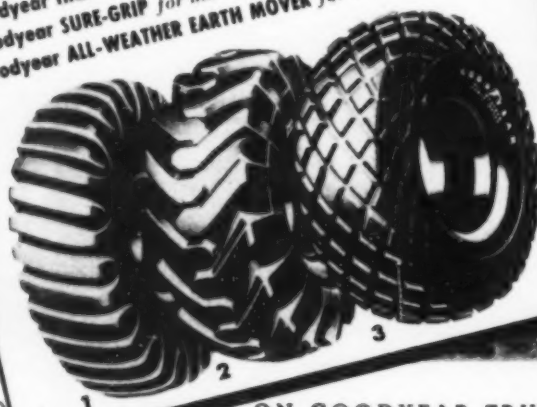
Why? They've found that Goodyears deliver more mileage, both before retreading and after. And they've discovered that these longer-wearing tires — with their specially designed treads — give better traction in the roughest kind of going.

Be sure you get top value out of your tire certificates. Pick out one of the three Goodyear huskies shown below — and see your Goodyear dealer about it today.

P.S. — Goodyear's free Truck Tire Engineering Service helps you with answers to questions on Rationing Regulations. And Goodyear dealers can arrange for retreading all sizes of off-the-road tires by factory methods that insure maximum extra service.



1. Goodyear **HARD ROCK LUG** for all rock work
2. Goodyear **SURE-GRIP** for mud and soft going
3. Goodyear **ALL-WEATHER EARTH MOVER** for drawn dirt-movers



MORE TONS ARE HAULED

ON GOODYEAR TRUCK TIRES THAN ON ANY OTHER KIND

Construction Methods

ROBERT K. TOMLIN, Editor

Volume 24

AUGUST, 1942

Number 8

MATERIAL FROM WINDROWS on earth fill is picked up by elevating grader and discharged on screen suspended under end of boom.



Screening Rig

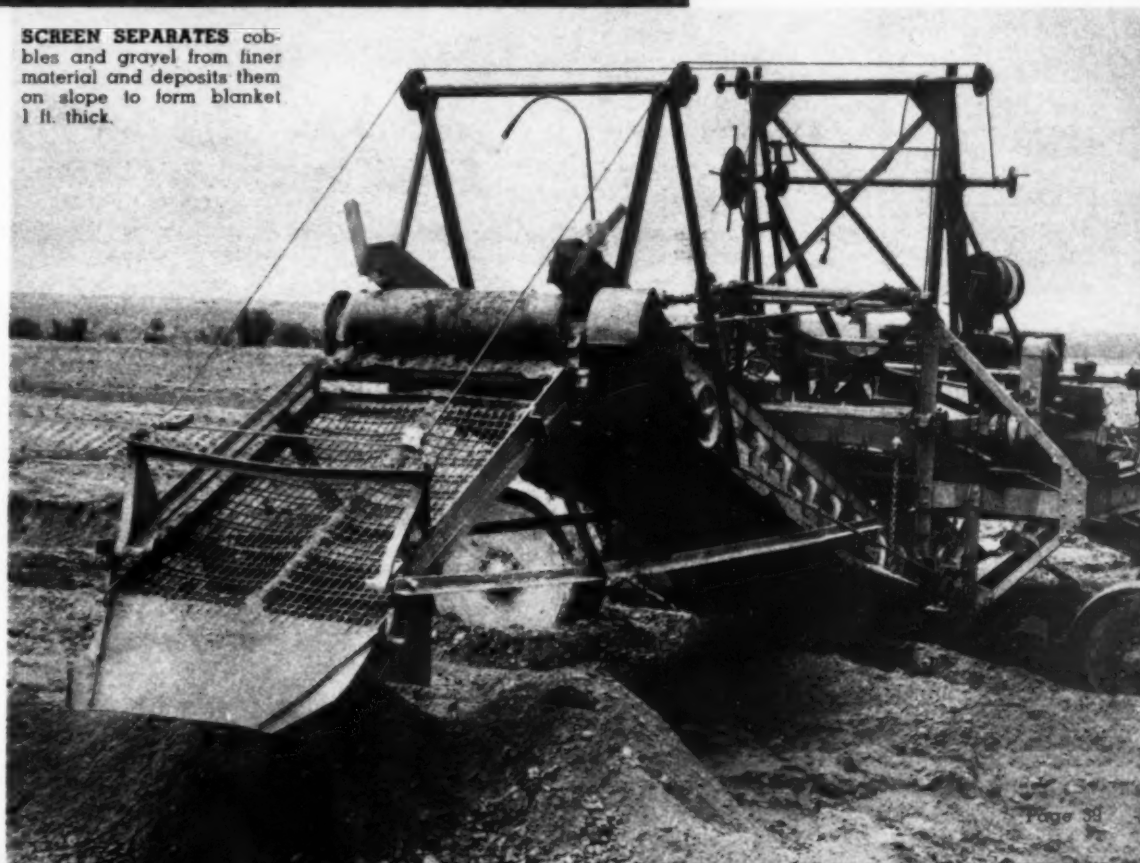
Provides Cobble Blankets
For Slopes of Earth Dam

By J. P. FREIN
Chief Engineer,
Caddoa Constructors,
Caddoa, Colo.

FOR PLACING A COBBLE AND GRAVEL BLANKET 1 ft. thick on the slopes of John Martin (formerly called Caddoa) Dam, 130-ft. high earthfill on the Arkansas River in Colorado, built for the U. S. Engineer Department, the job-made mobile screening device illustrated in the accompanying photographs was employed. The specifications suggested that materials for the cobble and gravel blanket might be removed from the pervious fill, after it had been placed in the dam, by bulldozing or raking. When these methods were adopted and proved unsuccessful, the contractors were confronted with the possibility of having to set up a screening plant to make the necessary segregation in the borrow-pit before materials were transported to the dam for either the per-

(Continued on page 118)

SCREEN SEPARATES cobbles and gravel from finer material and deposits them on slope to form blanket 1 ft. thick.



THIS MONTH'S NEWS REEL



SAVING STEEL and speeding plant erection for earlier expansion of aircraft engine production Mahony-Troast Construction Co. completes timber-frame building of Albert Kahn, Inc., designed for Wright Aeronautical Corp., in 45 days, two months less than normal building schedule.

Press Association



NATIVE STONE BRIDGE over Brazos River west of Mineral Springs, Tex., and less than 2 mi. below Possum Kingdom Dam, conserves critical metal by using less than 16 tons of steel. Comprising nineteen 20-ft. stone arches in overall length of 440 ft., bridge carries 24-ft. roadway serving State Highways 16 and 254. Structure is part of 25-mi. WPA road project recently completed in Palo Pinto County.

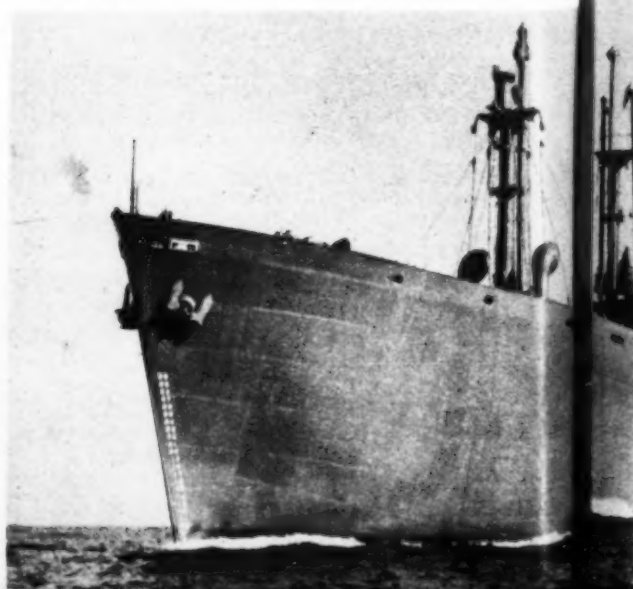
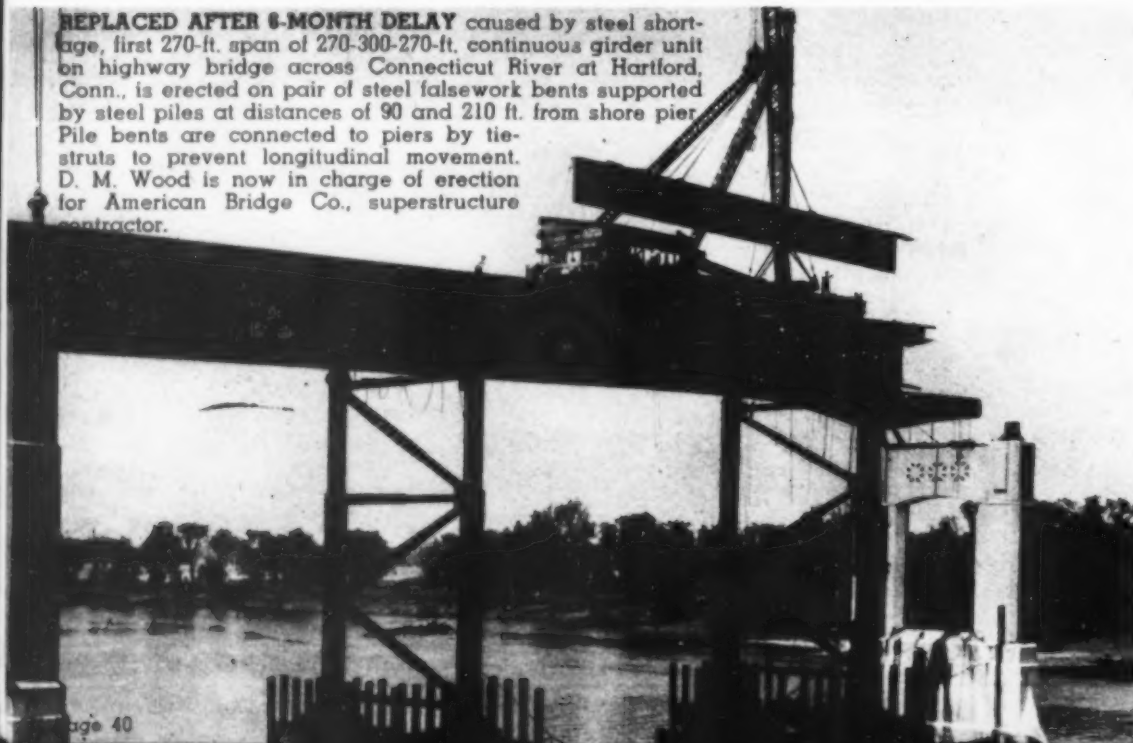


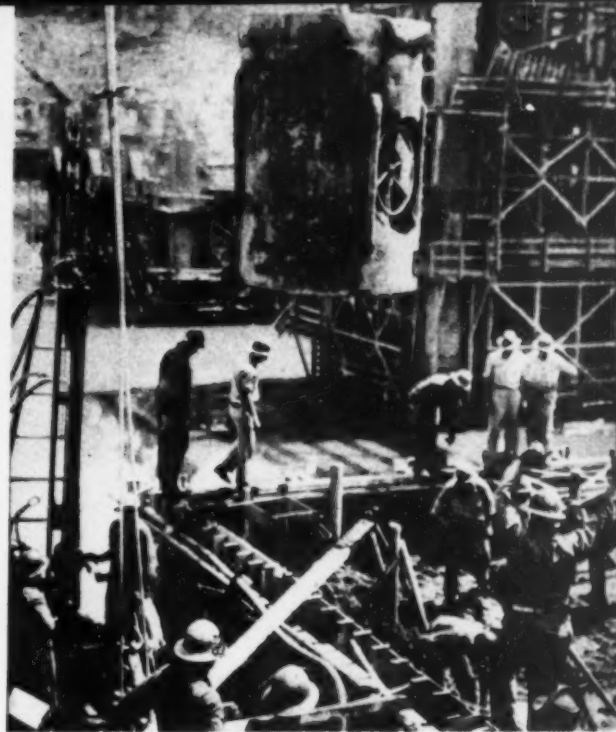
PREFABRICATED SHIP SECTIONS made up by Consolidated Steel Corp. of Los Angeles, in its Maywood plant and trucked to company's \$10,000,000 shipyard at Wilmington, Calif., are assembled into 12,900-ton passenger and cargo vessels of Maritime Commission's C-1 type. Inner bottom sections of kind shown here are put together upside down by yard crews on pre-assembly skids and are then turned right side up by cranes.



TYPICAL OF FIFTEEN OFFICES operated by one engineering and building organization (The Austin Co., of Cleveland, Ohio) to produce plans for vital war projects, this drafting room employs several score of company's 1,014 engineers at present working on design and construction of magnesium plants, chemical works and bomber assembly plants.

REPLACED AFTER 6-MONTH DELAY caused by steel shortage, first 270-ft. span of 270-300-270-ft. continuous girder unit on highway bridge across Connecticut River at Hartford, Conn., is erected on pair of steel falsework bents supported by steel piles at distances of 90 and 210 ft. from shore pier. Pile bents are connected to piers by tie-trusses to prevent longitudinal movement. D. M. Wood is now in charge of erection for American Bridge Co., superstructure contractor.





FOUR MONTHS AFTER AUTHORIZATION of \$30,000,000 Douglas Dam (left) on French Broad River in Tennessee, TVA forces place first bucket of concrete in structure (right), beating by 30 days Authority's previous record of five months in starting concreting of Cherokee Dam. TVA engineers hope to close 150-ft. high, 760-ft. long dam in time to impound next winter's rainfall. Scheduled for completion in 13 months, Douglas Dam will produce 90,000 to 100,000 kw. of war-industry power.



ARMY RAILROAD (left) for 48-mi. link between Camp Claiborne and Camp Polk, La., is laid by two crews, working toward each other, of 711th Engineers Railroad Operating Battalion, first unit of its kind in new U. S. Army. Battalion already has trained more than 6,000 troops to build, operate and maintain railroads. More than million crossties and thousands of rails have been laid by battalion crews.

Wide World

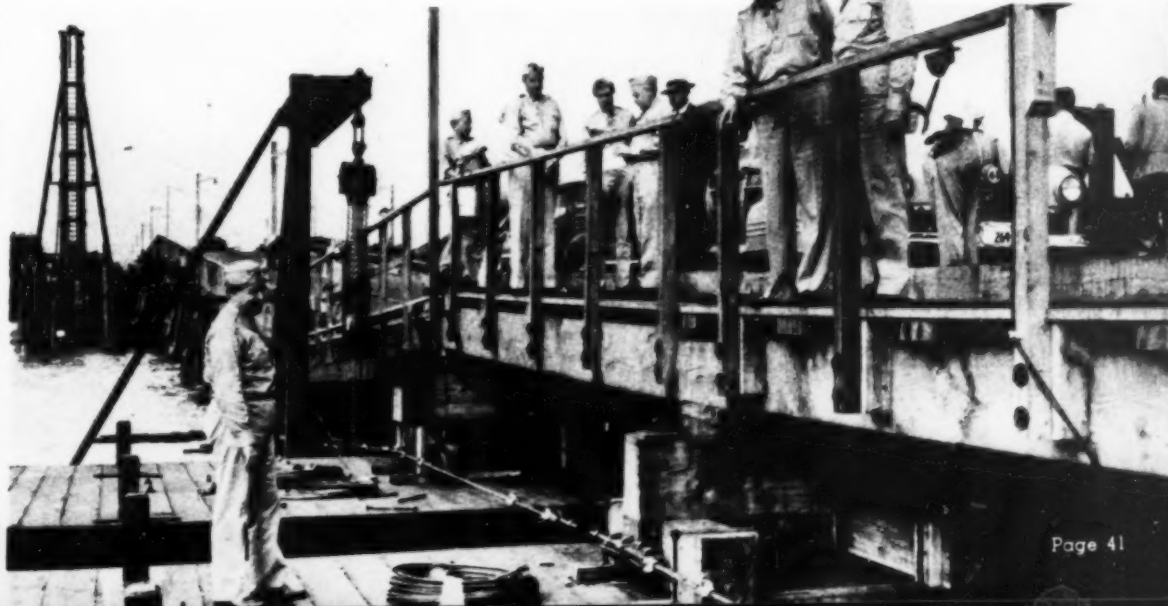


FIRST FLIGHT STRIP. designed as auxiliary roadside landing area for military aircraft, was formally opened July 1 by Army Air Forces and Public Roads Administration at location somewhere on Middle Atlantic seaboard. Studies have been completed on 80 additional sites for flight strips. War Department announces, and construction has begun on several of them. Flight strip illustrated here is 8,000 ft. long and more than 500 ft. wide, with runway 7,000 ft. long and 150 ft. wide paved with concrete 8 in. thick and flanked by stabilized soil shoulders. Additional photos and notes on this flight strip appear elsewhere in this issue.

WASHINGTON'S NEW FLOATING BRIDGE (below) across Potomac River at 14th St. S.W., is first of four ponton-trestle structures planned by Corps of Engineers, U. S. Army, to furnish additional traffic capacity over water barriers of crowded capital. Inspecting bridge are: Maj. Gen. EUGENE REYBOLD (at rail, pointing), Chief of Engineers, and Maj. Gen. T. M. ROBINS, chief of construction division, with Col. LESLIE GROVES (on ponton at left), deputy chief of construction division. Structure includes 2,031 ft. of trestles and ramps, 640 ft. of floating bridge on 30 12x65-ft. pontoons, and one fixed steel span providing opening 50 ft. wide by 21 ft. high. Starting work in May, Frederick Snare Corp., contractor, New York, completed bridge for opening in first week of July.

Arme

STANDARDIZED IN DESIGN for rapid construction by nation's old and new shipyards, Liberty ships of Maritime Commission EC-2 type, capable of carrying 10,500 dead weight tons, are being built on accelerating schedule calling for delivery of 1,500 of these cargo carriers before end of 1943. Illustrated article elsewhere in this issue shows how Oregon Shipbuilding Co. completes a Liberty ship, ready for sea, in 46 days.





Traffic Divider

**Provides Built-In Safety on
9 Miles of 4-Lane Parkway—
Plain Concrete Design
Saves 136 Tons of Steel**

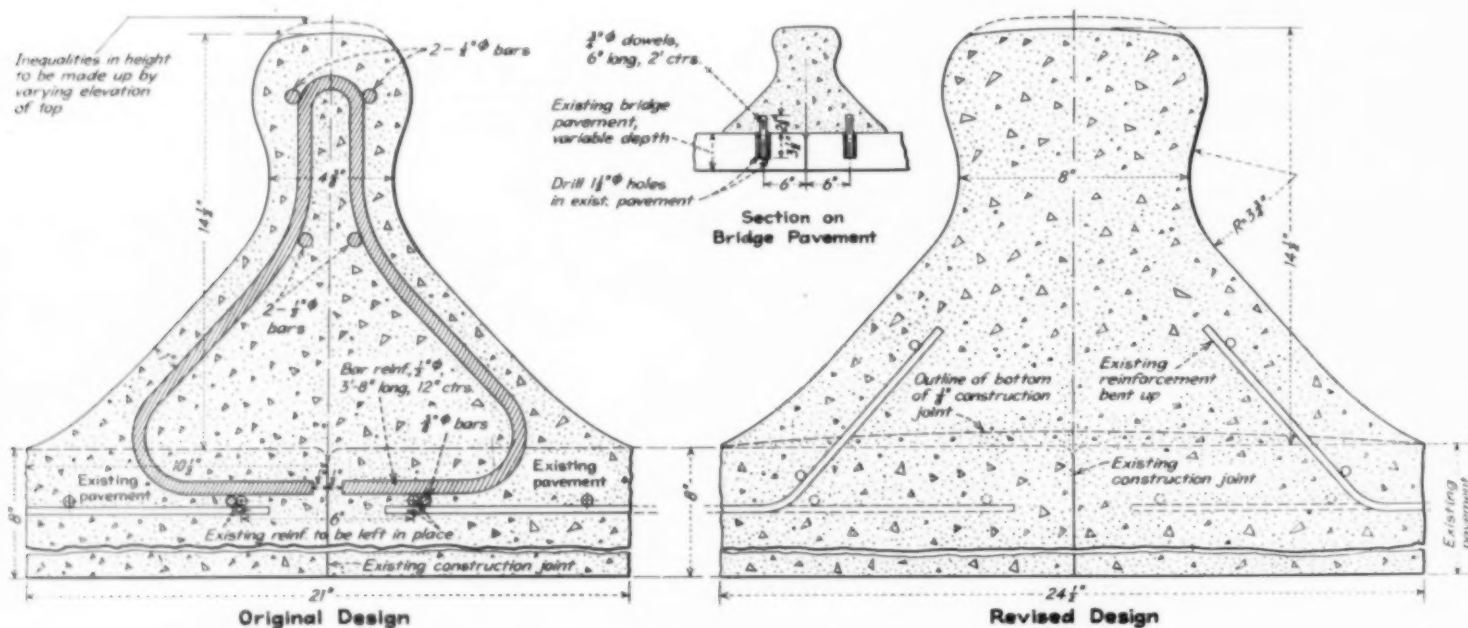
BUILT-IN SAFETY, in the form of a traffic divider of plain concrete design that saved 136 tons of steel reinforcement — a critical material in time of war — has been applied by New York City's Department of Parks, of which Robert Moses is commissioner, to a 9-mile length of the Grand Central and Interborough Parkways, heavily travelled, four-lane, concrete-paved routes linking Brooklyn with points east on Long Island and west to Manhattan and the Bronx. The divider, with sloping sides topped out by a curved "bull-nose" section, is a continuous concrete barrier, 14½ in. high, built along the centre line of the existing 44-ft. wide pavement to separate eastbound and westbound traffic and thereby prevent accidents resulting from head-on collisions or side-swiping of motor cars proceeding in opposite directions.

When the right-of-way was acquired by the City of New York for the Grand Central and Interborough Parkways, Park Commissioner Moses, who at that time, as chairman of the Long Island State Park Commission, represented the State of New York on construction of these parkways in the city, advocated sufficient right-of-way to provide for additional traffic lanes. The Administration, at that time, refused to acquire those rights-of-way. This accounts for the present plan.

A few years ago it became apparent that a center dividing

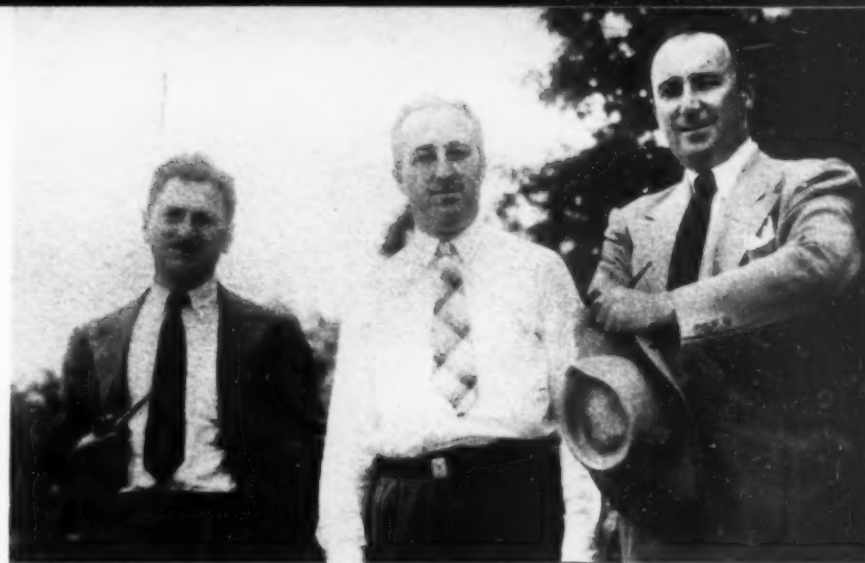
SEPARATION OF TRAFFIC LANES for cars moving in opposite directions is accomplished by concrete dividing wall 14½ in. high and 24½ in. wide at base, built along center line of 44-ft. wide concrete pavement for distance of 9 mi. Traffic lanes are re-marked with painted lines to compensate for 1-ft. reduction in useable width of each half of roadway.

ORIGINAL AND REVISED CROSS-SECTIONS of traffic divider, indicating how reinforcement was eliminated to save 136 tons of steel on 9-mile route.



curb was necessary on the parkway. The Department of Parks of the City of New York, the Long Island State Park Commission, the State Department of Public Works and the Triborough Bridge Authority cooperated in collecting data on various sections of curbs that had been designed or used throughout the country. Samples of these curbs were built on one of the parking fields at Jones Beach and were tested at great length by various people, including some of the daredevil automobile drivers who were at that time working in the Goodrich Exhibit at the New York World's Fair. As a result of these experiments a curb of reinforced concrete curved section, with a 6-in. steel pipe forming the top, was approved and a length of 1½ miles of this type of curb was built on the Interborough Parkway from Jamaica Ave. to Cypress Ave., in Brooklyn. Later, when contracts were prepared for the new divider, it was realized that steel pipe for the top could not be obtained under wartime conditions. The traffic divider, therefore, was redesigned, first to provide for a concrete section reinforced with steel bars and, finally, as a plain concrete section, eliminating the use of steel entirely.

Completed some years ago, the two parkways, one joining the other to form a continuous east-west route on which all grade crossings are eliminated by bridges or underpasses, tap dozens of suburban communities in Kings, Queens and Nassau counties and connect with Jones Beach on the south shore of Long Island, where swimming and other recreational facilities are enjoyed by thousands, especially on Saturdays and Sundays during the summer. As originally built,



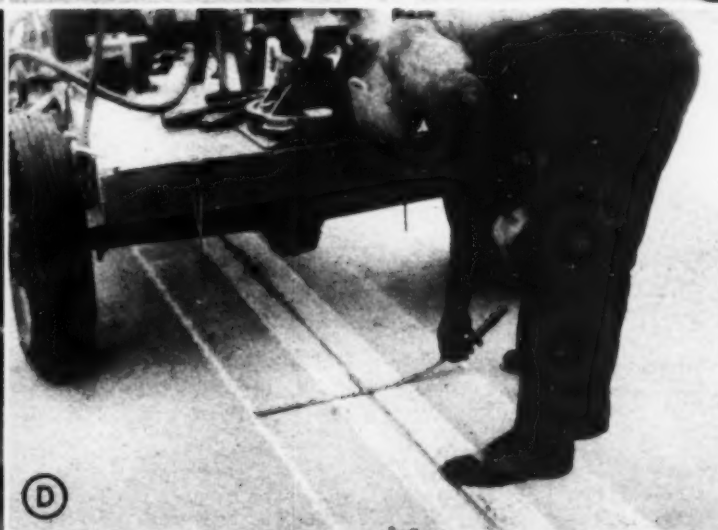
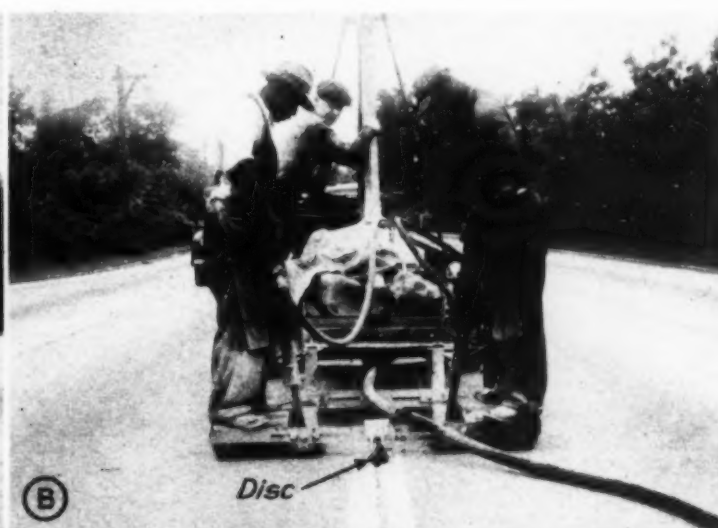
ENGINEERING AND CONSTRUCTION PERSONNEL on 9-mi traffic divider project includes: JOHN A. MULCAHY (center) resident engineer for New York City Department of Parks; H. D. Bender (left) engineering inspector, and HARRIS GRAND, contractor.

the parkways had four-lane, concrete-paved surfaces 44 ft. wide, consisting of either two 10-ft. inner lanes and two 12-ft. outer lanes, or four 11-ft. lanes. The concrete slabs are 8 in. thick, reinforced with 60-lb. wire mesh located about 2 in. below the pavement surface. Expansion joints are spaced 80 ft. apart.

After the parkway routes had been placed in service, motorists were quick to take advantage of the means they supplied for rapid, non-stop travel to and from localities on



LINE-CUTTING MACHINE scores concrete pavement to depth of ¾ in. as first step in breaking out trench along center line. Outfit comprises mobile unit (A) pushing low wheel-mounted platform carrying pair of pneumatic chisels supplied with air through hose line from truck-mounted compressor at right. On platform (B) traveling along pavement, two drillers operate pneumatic chisels held by guides at distances of 12¼ in. on each side



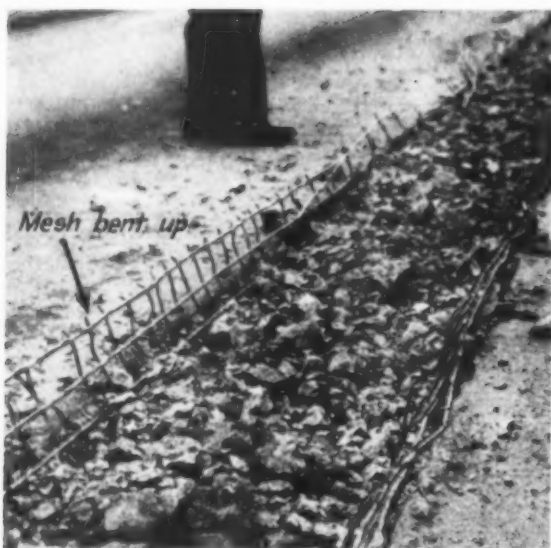
of center line. Travel of line cutter is accurately guided by disk (C) which runs in center-line joint while pneumatic chisels are maintained at correct distance from center by slotted guides on framework of platform. Accuracy of parallel scored lines (D) marking edges of trench to be cut in concrete pavement is checked regularly and shows variations of less than ⅛ in. from correct alignment.

SEBASTIAN RIBEIRO (below) is general superintendent in charge of field operations for Harris Grand, Brooklyn contractor.



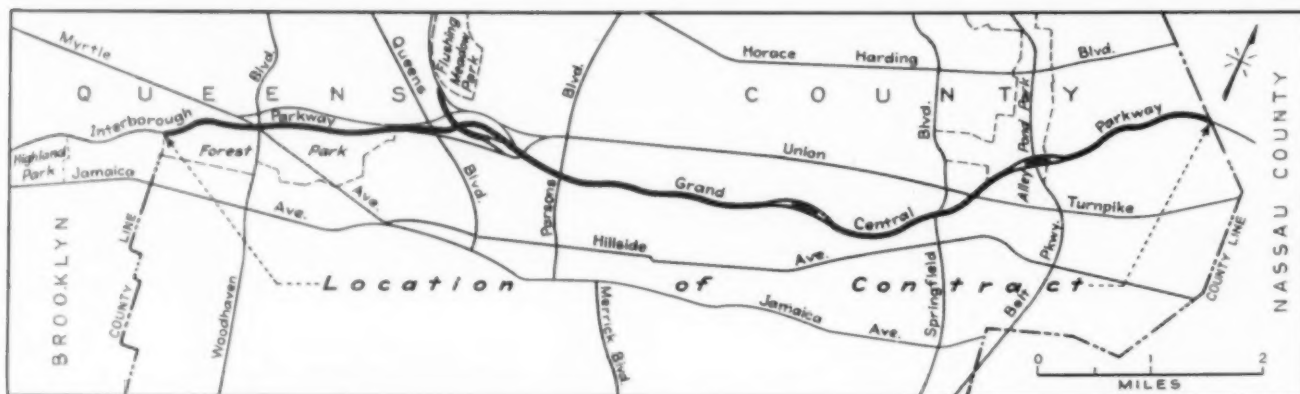
PAVEMENT BREAKER shatters concrete within scored lines of trench along center line. Truck-mounted machine is equipped on rear end with hammer operated by compressed air and striking 60 blows per minute. Standing at right is W. V. Cornett, of Concrete Cutting Corp., which had subcontract for breaking concrete.

EDGES OF CUT along center of concrete pavement are marked by parallel scored lines as first step in breaking out trench 24½ ft. wide for traffic divider.

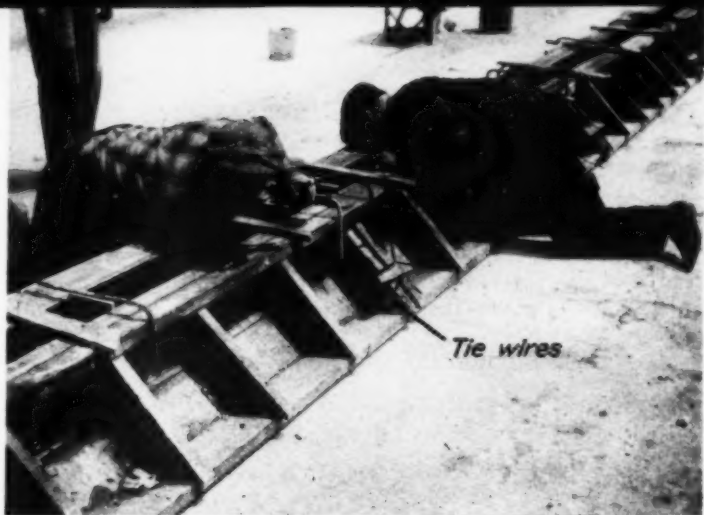


BROKEN CONCRETE (left) is ready for removal from trench in pavement. Wire mesh reinforcement from slabs is bent up to clear cut for shoveling out debris and is later bent down to 45-deg. angle for embedding in concrete of traffic divider to serve as anchorage.

TRENCH IS CLEARED (right) of broken concrete by hand shoveling, ready for pouring of concrete for traffic divider. During course of work normal parkway traffic is maintained on two outer lanes, while two inner lanes are blocked off for contractor's use.



NINE-MILE LENGTH of Interborough and Grand Central Parkways, from Brooklyn to Nassau County line is provided with plain concrete traffic divider 14½ in. high.



ANCHORING OF FORMS is done with tie wires which pass through holes in wood lagging and are fastened on inside to wire mesh reinforcement protruding from pavement slabs.

Long Island, Brooklyn, Manhattan and the Bronx. Traffic volume, especially on week-ends, increased to a point that resulted in a growing accident rate, in spite of a prescribed speed limit of 35 mi. per hr. It was decided, therefore, to remove the possibility of collisions by a physical separation of opposing lines of traffic. This safety objective has been attained by building into the existing pavement the longitudinal traffic divider or low concrete wall illustrated and described herewith.

Original Design Revised

Under the direction of James A. Dawson, the Park Department's director of engineering, designs for a concrete traffic divider reinforced with $\frac{1}{2}$ -in. steel bars were prepared before priorities established by the War Production Board at Washington, D. C., rendered dubious the prospect of obtaining the necessary steel. The design, therefore, was changed to provide for a plain, instead of a reinforced, concrete divider and this revision effected a saving of about 136 tons of steel reinforcing bars in the 9-mile length of the traffic-separating barrier. The accompanying drawings show details of the original and the revised cross-sections of the divider. The base width of the original cross-section was increased from 21 in. to $24\frac{1}{2}$ in. and the throat of the bullnose was thickened



WOOD FORMS in 8-ft. lengths are set along sides of trench cut along center of pavement to receive pour of concrete for $14\frac{1}{2}$ -in. high traffic divider. In left foreground is shaped filler for expansion joint.



SPILLING OF CONCRETE (above) is prevented by holding plate to deflect flow from chute into slot along tops of forms.

FROM TRUCK-MIXER, chute (below) delivers concrete through $5\frac{1}{2}$ -in. wide opening along tops of wood forms for traffic divider.



TO PREVENT SPREADING of forms when concrete is poured contractor applies clamps made by bending short lengths of $\frac{1}{2}$ in. steel reinforcing bars to form of channel. Between clamps is upper portion of expansion joint filler.

from 4 $\frac{3}{8}$ in. to 8 in. The height of the divider, 14 $\frac{1}{2}$ in., is the same in the original and the revised designs. The divider is provided with $\frac{1}{8}$ -in. wide construction joints spaced 8 ft. apart.

The feature of the new design, however, is its elimination of a total length of 9 ft. 8 in. of $\frac{1}{2}$ -in. and $\frac{3}{8}$ -in. steel reinforcing bars per linear foot of traffic divider, which figures out to about 136 tons of steel saved for the 46,000 lin. ft. covered by the project. The revised cross-section, because of lack of reinforcement, requires slightly more concrete than the original, the yardages per linear foot of divider amounting, respectively, to 0.096 cu.yd. and 0.083 cu.yd. While no

of the drawings, is anchored to the bridge pavement by pairs of $\frac{3}{4}$ -in. steel dowels 6 in. long, grouted into 1 $\frac{1}{2}$ -in. holes drilled into the concrete slabs to depths of 3 $\frac{1}{2}$ in. and extending up into the concrete of the traffic divider 2 $\frac{1}{2}$ in. These pairs of dowels, set 12 in. apart transversely, are spaced on 2-ft. centers along the length of the divider on the bridge roadways.

One other detail of the design involves provision for cross drainage of rain water on banked sections by building in the divider at pavement level diagonal scupper openings 9 in. wide and 3 in. high. Through these openings, storm water flows to the low side of the paved roadway.

STRIPPING OF FORMS reveals sloping sides and bull-nose contour of concrete traffic divider which extends to height of 14 $\frac{1}{2}$ in. above existing pavement. Construction joints $\frac{1}{8}$ in. wide occur at 8-ft. intervals.

FINISHING OF SURFACE of concrete is done with wood floats, after which colorless curing compound is sprayed on. **SANDBAGS** (inset) hold wood forms in place during pouring of concrete, supplementing wire ties anchoring forms to steel mesh in paving slabs.



new steel is called for by the revised design, it will be noted that in the 24 $\frac{1}{2}$ -in. cut made along the center of the concrete pavement to accommodate the traffic divider, the ends of the wire mesh reinforcing originally incorporated in the slabs are uncovered and bent upward at approximately a 45-deg. angle and embedded in the new concrete, as it is poured, to anchor the divider to the existing pavement slabs. The shape of the divider, with sides extending upward at approximately a 45-deg. slope and terminating in a curved nob or "bullnose", was designed to deflect the wheels of motor cars striking the barrier back onto the concrete pavement and thus reduce the possibility of the car's overturning or otherwise being damaged as the result of impact with the divider.

At a number of points where the parkways cross existing highways on bridges the traffic divider, as illustrated in one

Contract for building the 9-mile length of traffic divider on the parkway routes was awarded to Harris Grand, contractor, of Brooklyn, N. Y., the low bidder, at a price of \$146,564. As a further steel saving, the Park Department designers authorized the use of wood forms throughout the job.

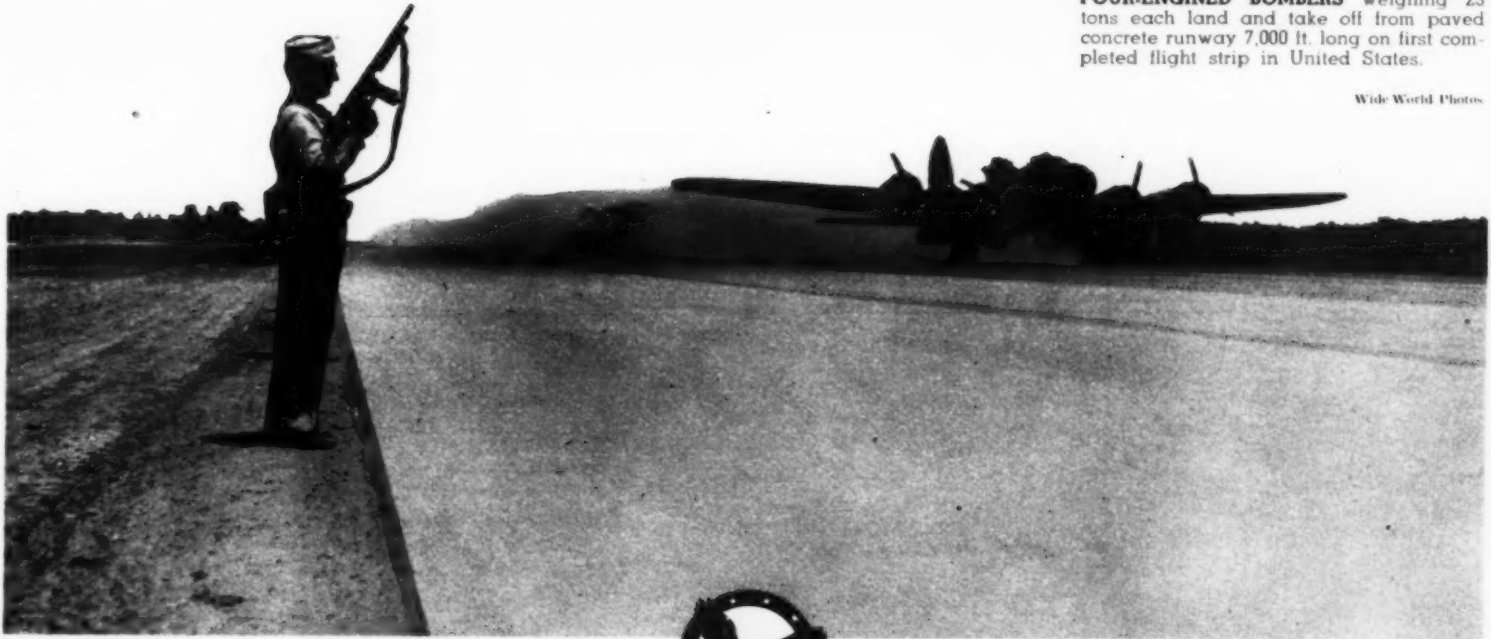
In sequence, the various steps involved in installing the concrete divider along the center line of the existing pavement are as follows:

Cutting Trench in Concrete Slabs — Operation No. 1 required the cutting of a 24 $\frac{1}{2}$ -in. wide center line trench through the 8-in. thickness of the existing mesh-reinforced concrete pavement slabs. This work was done in four stages with special equipment under a subcontract with the Concrete Cutting Corp., of Brooklyn. First, the pavement was scored by two parallel lines, each spaced 12 $\frac{1}{4}$ -in. from the

(Continued on page 120)

FOUR-ENGINE BOMBERS weighing 23 tons each land and take off from paved concrete runway 7,000 ft. long on first completed flight strip in United States.

Wide World Photos



COMPLETED BY THE CONTRACTOR 15 days ahead of the 75-day time allowance, the nation's first flight strip was formally opened July 1, somewhere on the Middle Atlantic seaboard, by the Army Air Forces and the Public Roads Administration. The flight strip is 8,000 ft. long and more than 500 ft. wide, with a runway 7,000 ft. by 150 ft. paved with concrete 8 in. thick. Stabilized soil shoulders surround the runway, which is capable of handling the largest bombers now being flown by the Army Air Forces.

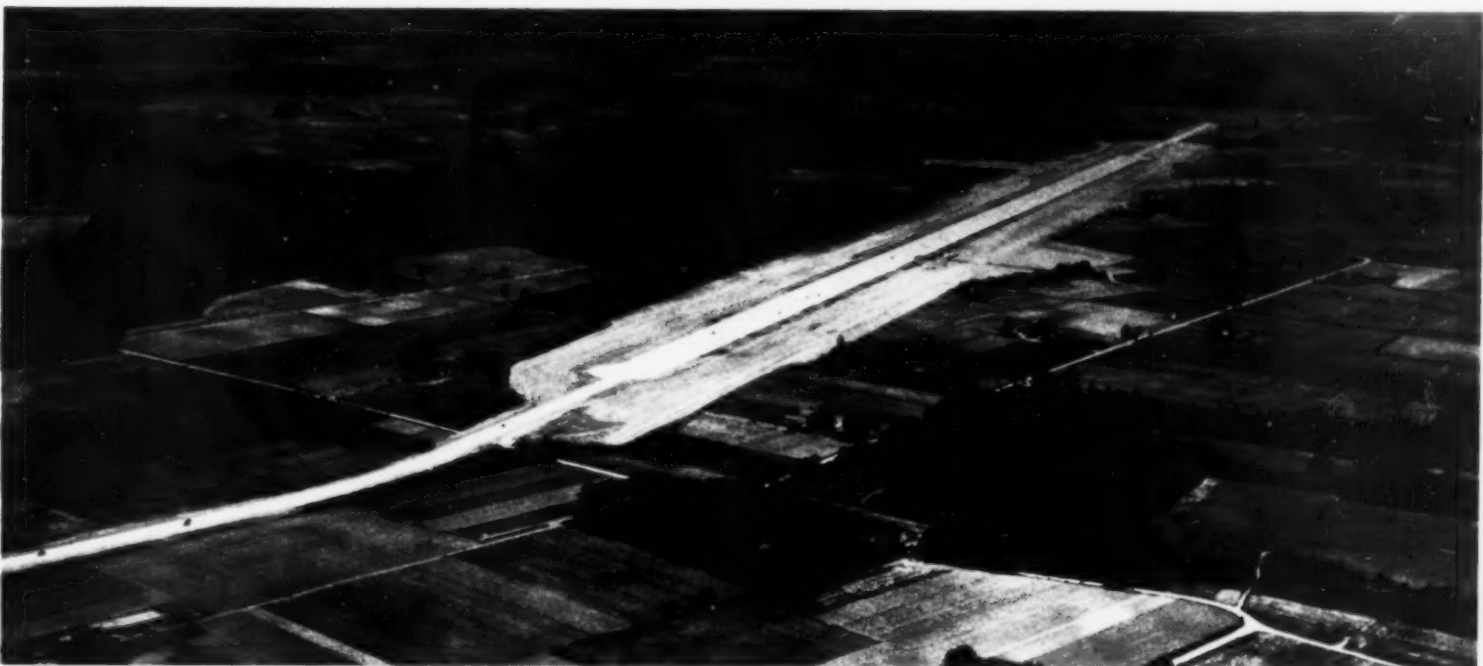
Studies have been completed on some 80 additional sites for flight strips, and construction is well advanced on a number of them. The Army designates the strategic areas in which the flight strips are to be located, and the Public Roads Administration selects the sites and submits them to the Army Air



First Flight Strip

Forces for approval. General plans and specifications are supplied by the Air Forces to the Public Roads Administration, which has charge of construction. Work is undertaken on successive sites in the order determined by the army.

Flight strips are designed to be used for emergency landing fields, for training purposes and for dispersal of aircraft in event of attack. Basic factors governing their location, design and construction were described by Col. Stedman Shumway Hanks, projects officer for the flight strip program, Army Air Forces, in *Construction Methods* for May, p. 53. The Defense Highway Act of 1941 authorized \$10,000,000 for the program, and \$5,000,000 of this authorization already has been appropriated. The first set of flight strips, financed by this appropriation, will be completed by early fall.



NATION'S FIRST FLIGHT STRIP, completed by contractor in 60 days, is 8,000 ft. long by more than 500 ft. wide. Runway 7,000 ft. in length is paved with concrete 8 in. thick and 150 ft. wide. Stabilized soil shoulders surround paved runway.



ERECTION OF TIMBER FRAME by battery of mobile hoist derricks follows rapidly upon completion of pedestals for columns.

Wood-Frame Warehouses

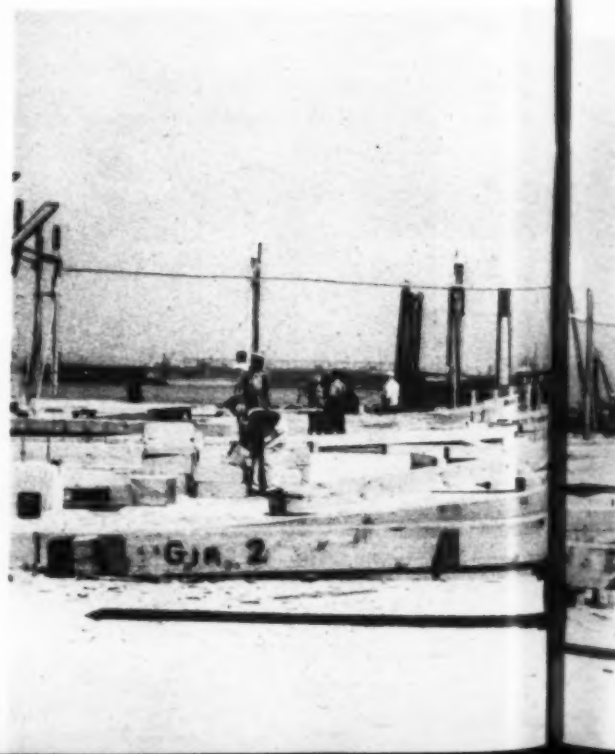
**FOR NAVY
SAVE BOTH TIME
AND STEEL**



TRUCK MIXERS place concrete in 12-in. foundation mat which serves as floor of building and eliminates need for piles in new hydraulic fill. Reinforcing bars for column pedestals are embedded in concrete slab.



SECOND LAYER (left) of reinforcing mesh is embedded in slab 2 in. below top surface. Workmen screed and float surface by hand.



TO MEET A TRIPLE OBJECTIVE embracing economy, speed and conservation of critical materials, contractors on a supply depot for the Navy Department produced a mill-type, slow-burning, wood-frame design for a group of large warehouses and arranged to support these buildings on thickened concrete floor slabs which serve as foundation mats on fresh hydraulic fill, eliminating need for piles. By comparison with concrete-and-brick warehouses of equal size constructed by the contractors on cast-in-place piles at the same depot, each of the new buildings saves 547 tons of metal, mostly steel, and goes up in much shorter time at greatly reduced cost. Foundation mat and superstructure of a wood-frame warehouse can be completed in about 25 working days, less than one-third of the time required to build the superstructure of a reinforced-concrete unit after the concrete foundation piles have been installed.

Careful pre-planning of operations speeds construction of the wood-frame warehouses. The concrete foundation slab for one building comprises six sections, containing about 800 cu.yd. each, separated by expansion joints; concrete is placed in these floor sections by truck-mixers at the rate of one section a day. Within a few days, after the slab has hardened sufficiently, short concrete pedestals for the timber-frame columns are built in forms on the foundation mat.

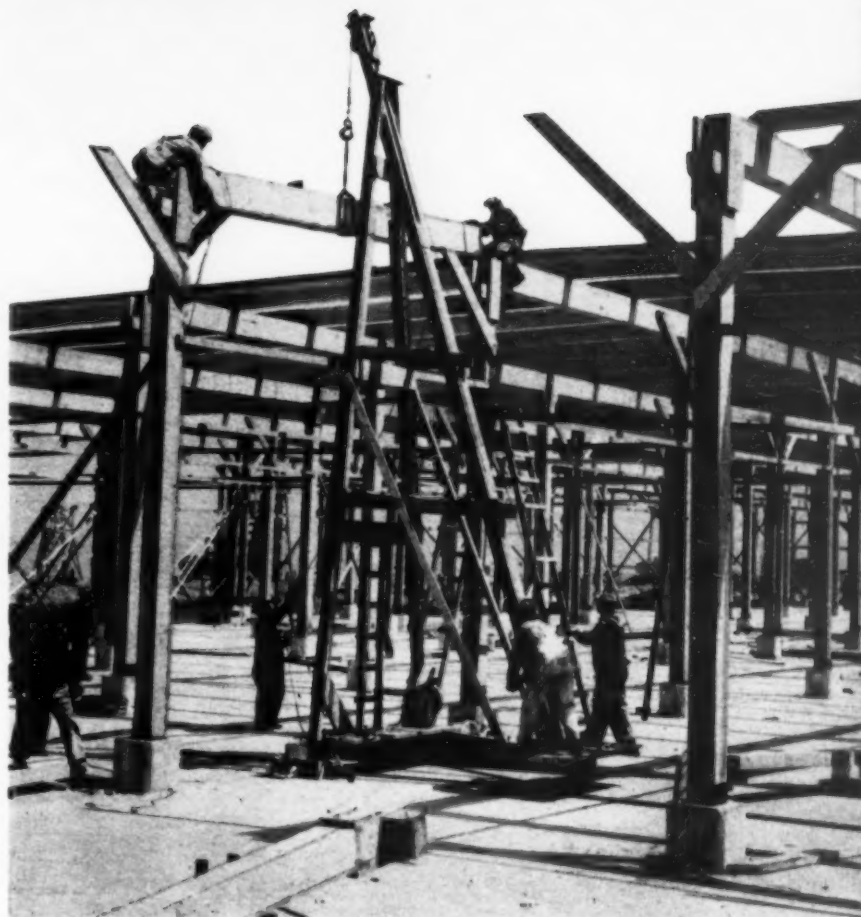
Precut Timbers

Timbers for the warehouse frame arrive on the site precut to exact size and shape, in accordance with detailed dimension drawings furnished by the contractors to the lumber supply company, which operates a mill near the project. All pieces are marked at the mill to identify them for speedy sorting and erection on the job. The timbers are delivered on truck trailers directly from the mill to the building.

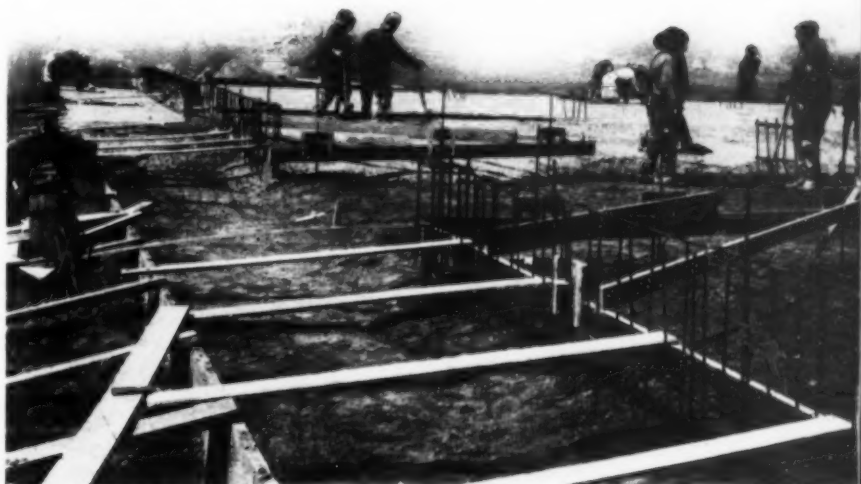
For setting the timbers, the contractors' crews use hand-operated winch hoisting rigs mounted on swivel casters which roll easily over the concrete floor. Accompanying photographs indicate the details of these mobile hoisting rigs.

With the exception of lag bolts which fasten the timber posts to steel anchor straps protruding from the concrete pedestals, no bolts are used in the construction of the buildings. Timber bolsters to carry the girders are mounted on the column tops and held in place by spiked wooden scabs before the columns are erected. The mobile hoist derricks set the girders on the bolsters between the protruding scabs and raise the purlins, which are attached to the girders by steel angle clips spiked both to the girders and to the purlins.

Following erection of the skeleton frame by the framing crews, roof erectors lay a deck of long-span reinforced tongue-and-groove gypsum plank, and sidewalls are inclosed with sheets of corrugated asbestos-cement siding attached to



GIRDER with purlin clips attached slips into place between scabs on column bolster.



OUTSIDE APRON of floor slab extends 5 ft. beyond grade beam for exterior wall of building. Steel reinforcing bars for grade beam are in place. Note opening for truck door.



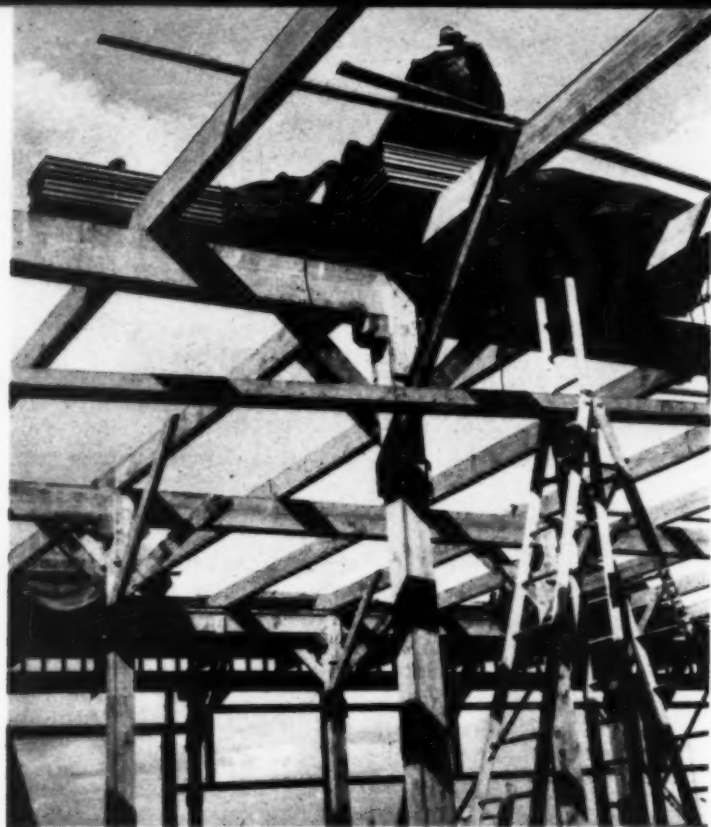
PRECUT to exact size and shape (left), timbers arrive on job marked to speed handling and erection. Framing accessories such as purlin clips on this girder are attached before members are erected.

CONCRETE PEDESTALS (right) 20 in. high for columns of timber frame are cast in forms set on completed slab. Steel anchor straps for timber columns are suspended in pedestal forms to be incased in concrete.

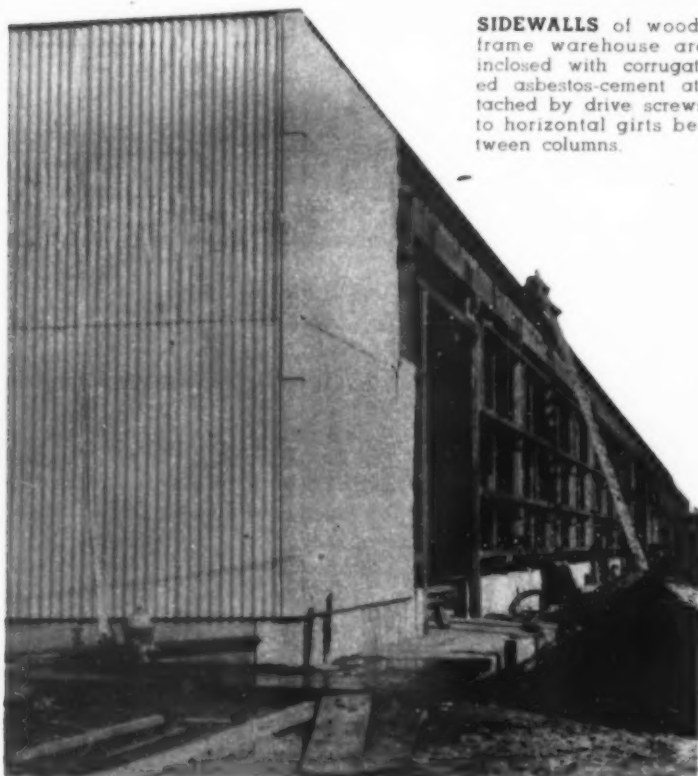




ON COMPLETED TIMBER FRAME, roof erectors start to lay deck of 2-in. gypsum plank spiked to purlins.



GYPSUM UNITS for roof deck are stacked on purlins and covered with tarpaulins until wanted by roof erectors.



SIDEWALLS of wood-frame warehouse are inclosed with corrugated asbestos-cement attached by drive screws to horizontal girts between columns.

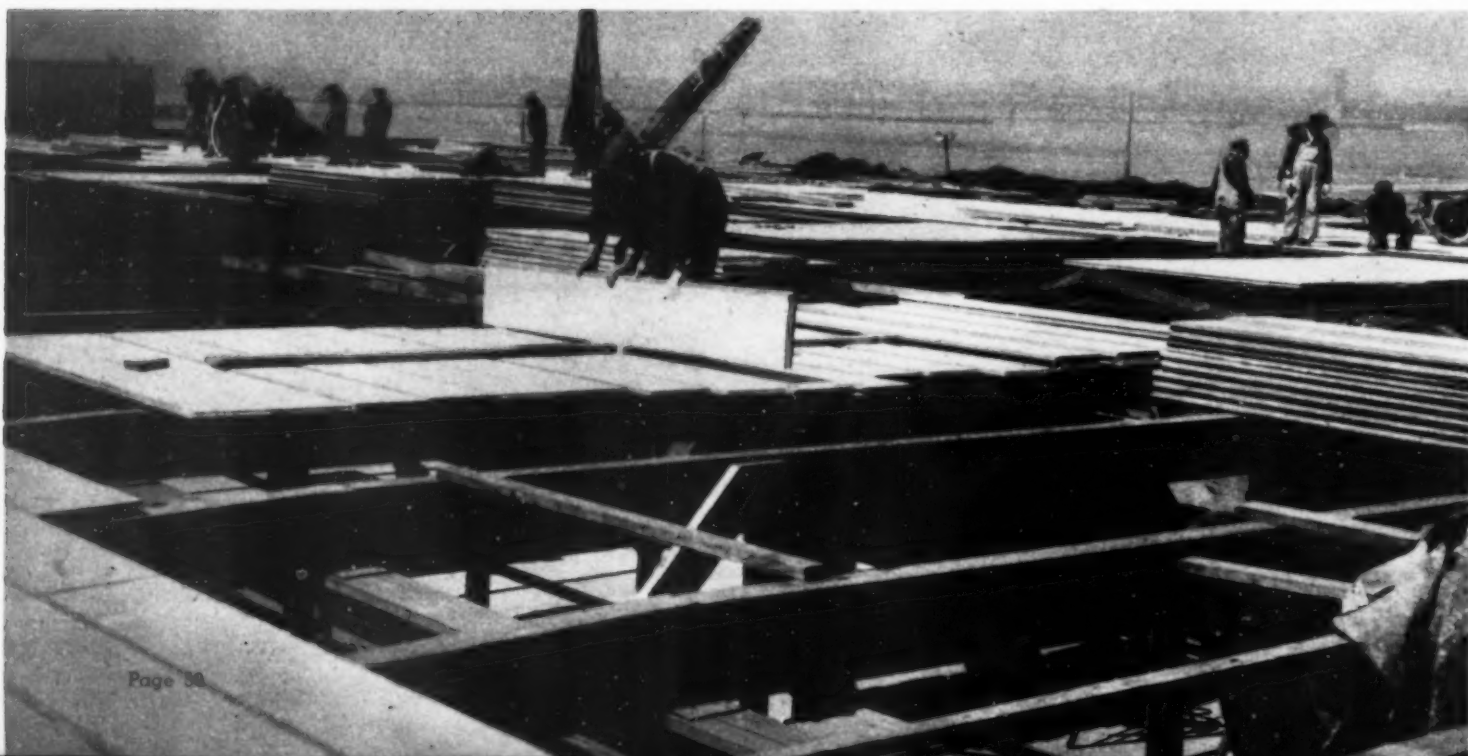
horizontal girts with drive screws. The gypsum roof deck is spiked to the timber purlins.

Adoption of the wood-frame mill-type design on concrete foundation slab preceded issuance by the Secretary of the Navy of a general directive to govern new building construction on Navy projects, but the design is in complete conformity with the three principles laid down in the directive. These principles are as follows: (1) No buildings are to be undertaken unless they are essential to war purposes; (2) buildings which must be erected are to be of the most economical, temporary construction; and (3) plentiful materials are to be employed in the construction of such buildings.

Ample stocks of timber, gypsum plank and corrugated asbestos-cement siding were available for the warehouses. Steel demands were kept as low as possible. The heavy concrete slab under each building is reinforced with two layers

(Continued on page 114)

LONG-SPAN GYPSUM PANELS (below) nailed to purlins have interlocking tongue-and-groove metal edges which mesh to form continuous deck. Workmen are laying out gypsum units to facilitate handling into final position in roof deck of warehouse.





BUOYANT ONE-PIECE SUIT keeps member of Quartermaster Corps detail afloat as he installs floating 3-in.-diameter pipe line to carry gasoline across fast-flowing 1,100-ft. wide Pee Dee River during Army's maneuvers in North Carolina. Line is anchored at intervals to rope stretched across stream and is jointed with aid of special fire hose.

Photo, Quartermaster Review



RUBBER IN \$2,500 CHUNKS is represented by these big tires for earth-moving equipment used in constructing military airports and army cantonments. Some of larger tires are valued at \$2,500 and contain a percentage of reclaimed rubber.



NAILS 290 YEARS OLD are taken from Smith's Fort Plantation, oldest brick building in Virginia. Long life of nails is attributed to fact that they are square cut out of genuine wrought iron. Similar wrought-iron nails are produced today by Tremont Nail Co. of Wareham, Mass. Photo shows modern nail at left and three old nails driven in year 1652

JOBS

oddities



WAR BOND ROMANCE reaches climax in Cleveland offices of Austin Co., engineers and contractors designing new magnesium plants for war-time aviation. During drive which netted sales of \$27,900, war bonds to 251 employees Carl J. Giblen, chief timekeeper for Austin, not only audited bond sales records of Miss Mercedes Smuk, secretary of drive, but also started courtship which resulted in marriage of pair. (at left) Company receives Treasury Minute Man Banner presented by Brig. Gen. Newell C. Bolton, as Chairman A. H. Lindquist (right) looks on.



ROADSIDE SPEED TIMER is used by California Division of Highways as aid in traffic studies. With two-cell, photoelectric, bidirectional electronic device, installed under supervision of W. M. Rieth, district traffic engineer, traffic speeds are read and recorded. Length of base line between tubes on equipment is 17.6 in. Outfit weighs 55 lb.



KEEPS TRACTORS, SCRAPERS AND GRADERS ROLLING

CONTRACTORS

Here are a number of practical suggestions for getting more work out of your tractor equipment and cutting down on repair bills and idle time. Pass them along to your machine operators. — EDITOR

By E. L. AIKINS, Industrial Service Manager, Tractor Division, Allis-Chalmers Manufacturing Co., Milwaukee, Wis.

SUPPLY IS FIGHTING a losing battle with demand where new construction equipment is concerned. Priorities, scarcity of critical materials, conversion of normal plant production to war materiel, and the urgent requirements of our armed forces, reflected in an all-time high of more than 13 billion dollars as the estimated volume of construction for the current year, have rendered dubious the prospect of enough new heavy-duty equipment to satisfy both public and private construction needs. With all production lines straining to the utmost to fill military requirements it becomes a patriotic duty not only to reduce to a minimum private and public demands for equipment, but also to conserve present equipment, to repair it and place it on only the essential jobs.

To accomplish these objectives there are certain precautions in the form of preventive maintenance that may be taken by construction men to get the most out of present equipment. Within every engineering or construction organization it might be well to call a meeting of all employees, everyone who has even the most remote connection with equipment. Explain to them the vital necessity of an equipment conservation program, how it affects them and our nation; the part they are playing in backing up our boys at the front; how every machine they "keep rolling" permits a manufacturer to deliver one more to Uncle Sam. Everyone on the home front has a job to do—their's is to "keep 'em rolling."

The next step is to train and educate personnel along lines that will conserve equipment. It is not enough that the operator know how to operate the machine; he must know how to take care of it, know when minor adjustments are necessary and be able to make them. He must know how to use his machine without abusing it.

The following general suggestions will be found helpful in connection with tractors, scrapers, and graders.

TRACTORS

TAKE IT EASY. More equipment is ruined, its efficiency impaired, and operating cost increased through overloading,

than from any other single cause. A good, skillful operator maintains the "feel" of the load at all times and can adjust his machine accordingly. Spinning tracks, "cracking" steering clutches to snake the tractor along, releasing the master clutch to regain engine speed then jamming in the clutch, are all tough on the machine. It is much better to ease up on the load and save the machine.

OIL AND GREASE REGULARLY. Follow the manufacturers' instructions. The manufacturers of equipment have issued instructions with respect to this type of service, for the equipment owner's protection. Follow them rigidly—they've been prepared to make the machine last longer and perform better. If a certain type of oil is recommended, *use it*. Oils and greases are approved by manufacturers only because they meet certain conditions peculiar to that machine. Don't listen to neighbors, salesmen and dealers selling unrecommended oils and greases or any other advice on this matter. *See your instruction book* or write to the manufacturer.

DISCOURAGE EXCESSIVE TRAVEL. Tracks are most subject to wear and therefore crawler tractors should not be subjected to long road trips. It will be cheaper in the long run to haul them by truck or trailer. When traveling on a crowned road, travel in the center if possible in order to equalize wear on both tracks. Avoid, whenever possible, driving a track-type tractor on hard-surfaced roads. If it is necessary, never travel at high speed.

When pulling a grader, offset the tongue or use a cable so that the tractor rides on the level and generally on better footing. A swinging drawbar should be employed.

SHARP TURNS. Short, spectacular turns at high speed should be avoided because of possible track injury. However, equally injurious are wide sweeping turns with one clutch disengaged, because of the excessive wear to which clutch disks and throwout bearings are subjected. Make your turns as quickly and directly as possible; disengage the clutch, step on the brake, make your turn and head toward your objective.

Do not keep turning in one direction. If at all possible lay out your job so that you can turn alternately to the left and

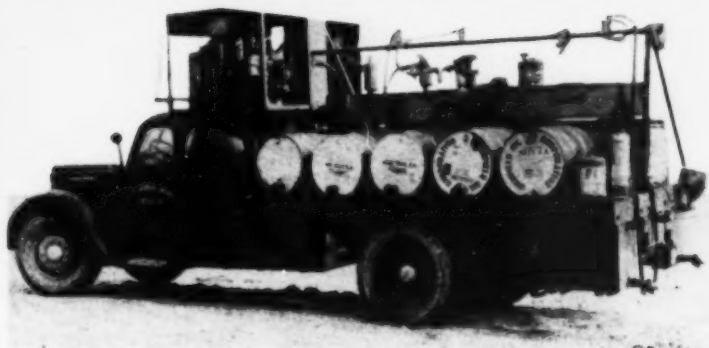
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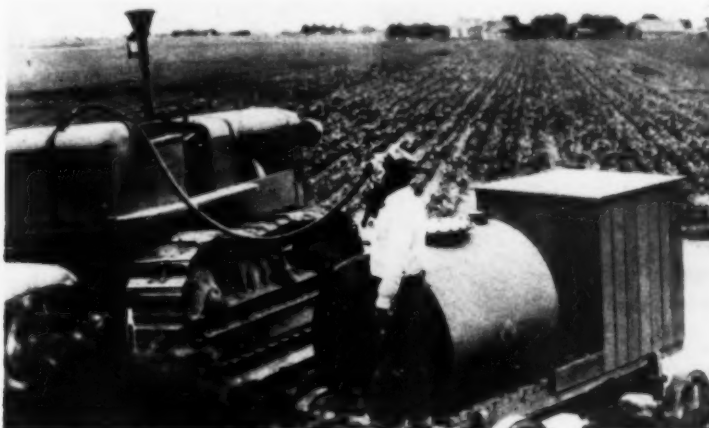
LUBRICATION of all construction equipment should be done regularly with oils and greases recommended by equipment manufacturer.



IT IS CHEAPER in long run to transport track type tractors on trucks or trailers than to permit them to pound along on hard roads for great distances.



MOBILE SERVICE STATIONS are maintained by many contractors on large jobs to deliver lubricants and fuel to equipment in field. This truck of Guy F. Atkinson Co. at Hansen Dam, in California, carries drums of oil and grease and is equipped, behind driver's seat, with 2-cycle diesel engine operating an air compressor to serve grease guns and inflate tires.



CLEAN FUEL should be used. It should be kept in clean storage tanks from which fuel can be pumped directly into equipment.

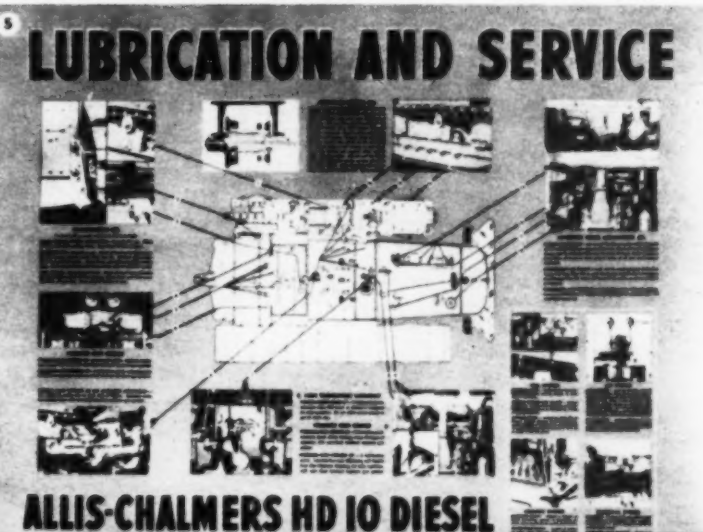
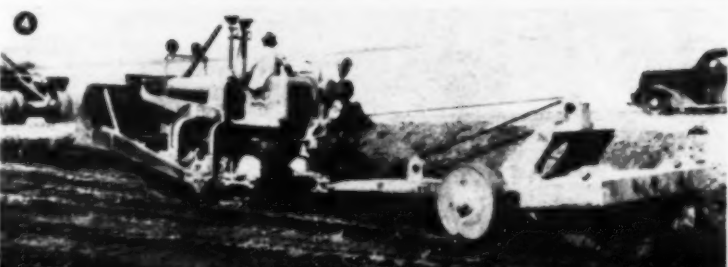
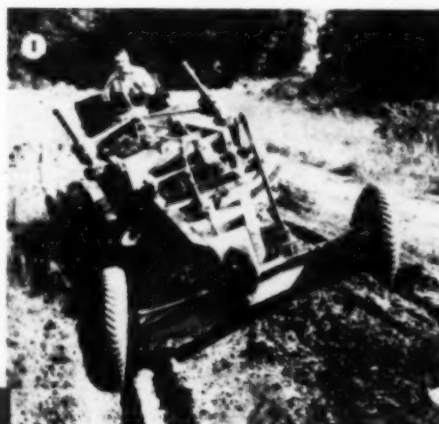
1 TIRE WEAR on motor graders can be reduced by leaning front wheels of machine to prevent rubbing against bank.

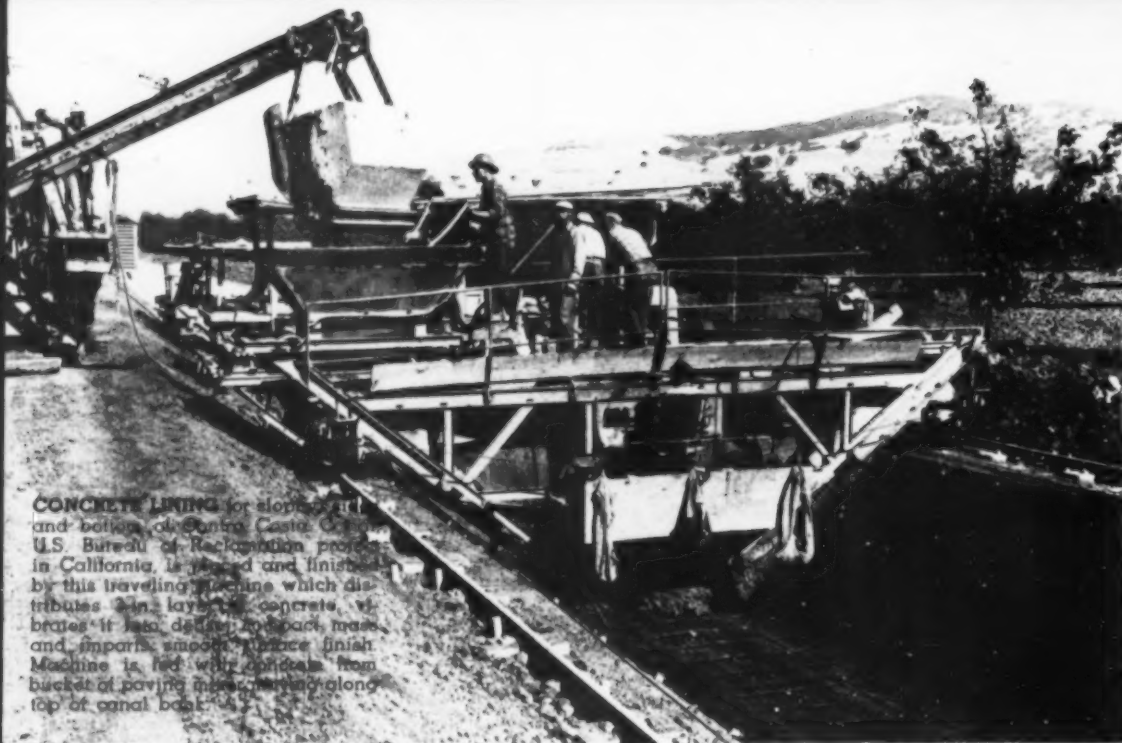
2 WHEN WORKING IN DITCH cable attached to tongue of grader permits tractor to travel on level surface of road shoulder, thereby reducing track wear.

3 AFTER TRACTOR-ROOTER OUTFIT has loosened material, it may be used as pusher unit to speed up loading of scraper.

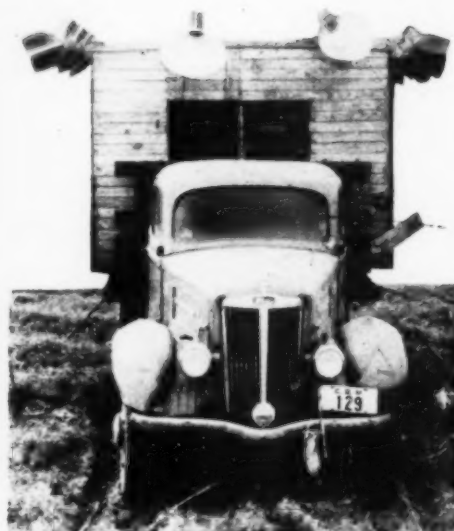
4 TO FACILITATE SCRAPER LOADING, hard material should first be broken up by rooter.

5 ADVICE ON PROPER LUBRICATION for construction equipment is offered by manufacturers in form of large wall charts, such as this one for Allis-Chalmers HD10 diesel tractors.





CONCRETE LINING for sloping sides and bottom of Santa Costa Canal, U.S. Bureau of Reclamation project in California, is placed and finished by this traveling machine which distributes 2-in. layers of concrete, vibrates it into desired compact mass and imparts smooth surface finish. Machine is fed with concrete from bucket of paving machine mounted along top of canal bank.



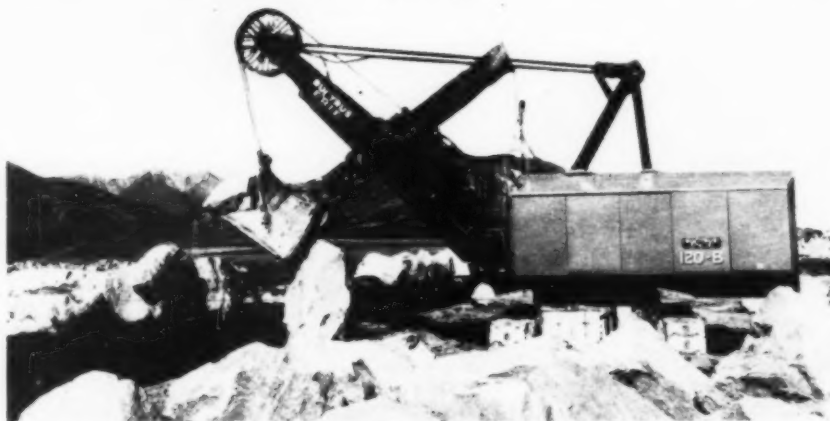
LIGHT FOR NIGHT WORK at Camp Gordon near Augusta, Ga., is furnished by this mobile outfit consisting of White motor truck carrying Caterpillar diesel-electric set which serves group of flood-lights.

HOW

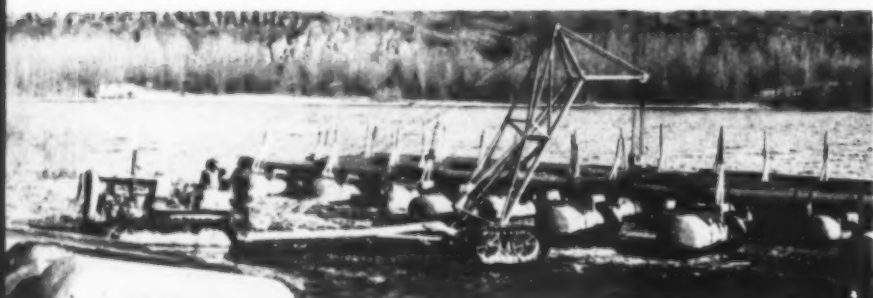
They Did It

CONSTRUCTION DETAILS

For Superintendents and Foremen



BIG ROCKS for breakwater construction are loaded on to railway flat cars by Bucyrus-Erie 120-B power shovel with 4½-cu.yd. dipper, for transport to Terminal Island (Calif.) job of Guy F. Atkinson Co., contractor. Shovel does all its own local switching, moving cars along with its boom as they are loaded.

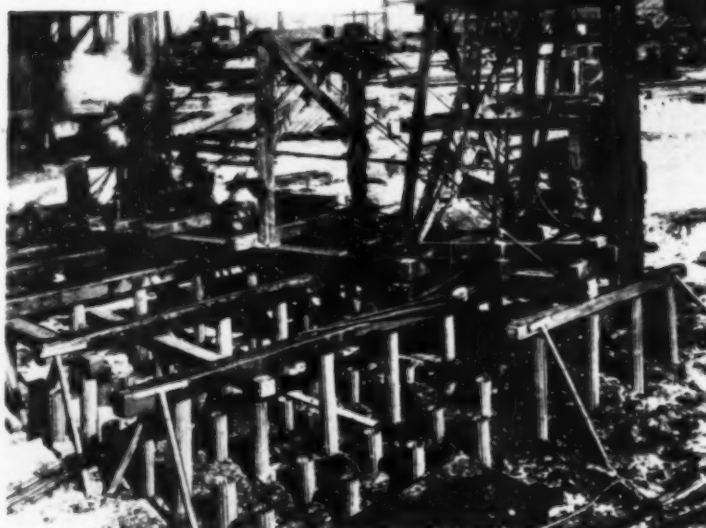


LIFTING AND HAULAGE of 6-ton pontoons to support dredge pipe line at Mississippi River dam at Hastings, Minn., is done with Le Tourneau tractor-crane operated by La Crosse Dredging Co., of La Crosse, Wis.

TRENCHES FOR CONCRETE FOUNDATIONS (below) of buildings at Army's Ravenna shell-loading plant in Ohio are speedily dug with Barber-Greene vertical-boom ditcher as substitute for slow hand-labor methods. Machine operated by Hunkin-Conkey Construction Co. of Cleveland, Ohio, has 8-ft. 3-in. vertical boom and is used also in excavation for sewer, drainage and conduit construction. The Ravenna project has involved construction of 900 buildings.

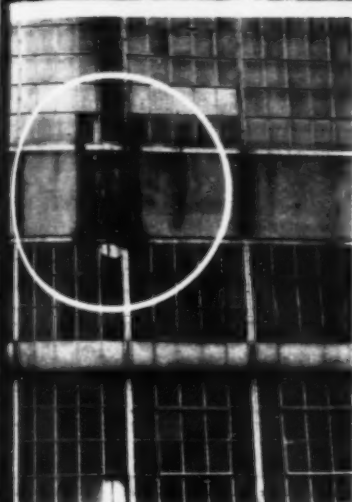


WOOD CRIBBING IS ELIMINATED underneath piledriver on this foundation job for 900-ton blast furnace by supporting rig directly on Union Metal monotube steel pile casings, later filled with concrete. Pile casings were driven to 85-ft. depth in one piece and short extensions were tack-welded intermittently to tops to support cap timbers on which piledriver moved. Rigidity of pile casings make cross-bracing unnecessary. Job required driving of more than 600 piles.





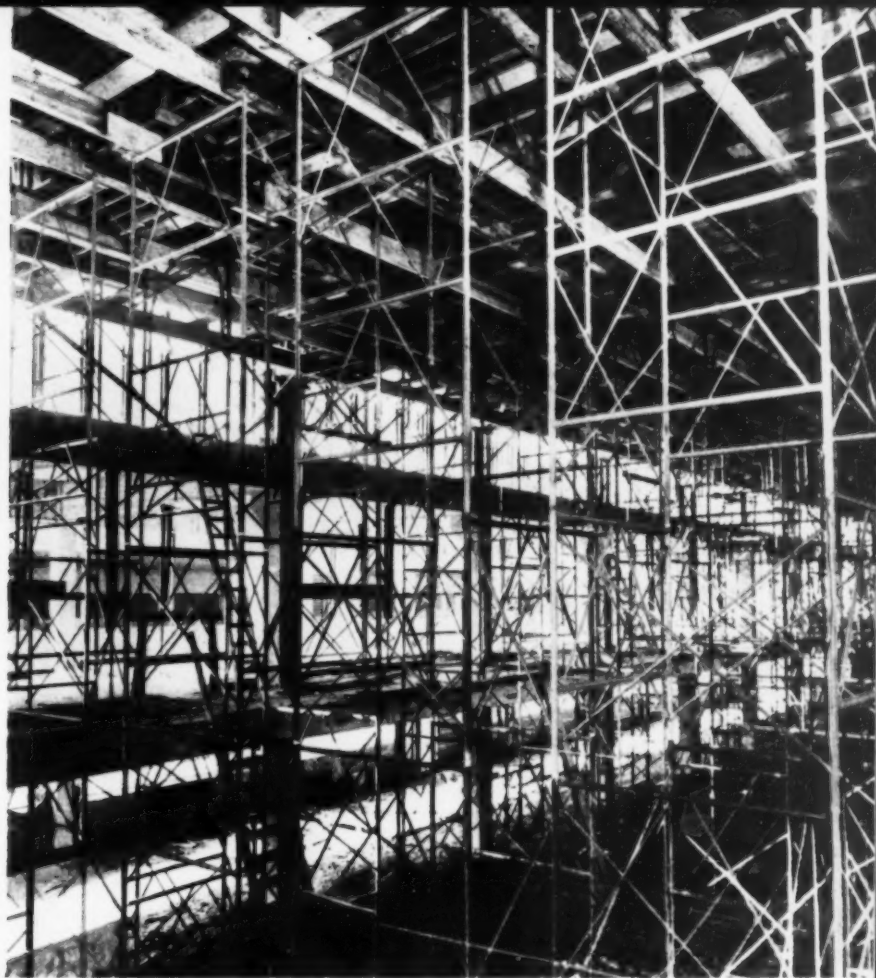
HYDRAULIC JACKING DEVICE (above and below) mounted on truck presses track pins in or out of track links on crawler tracks for tractors and excavators at equipment servicing yard of Giles & Ransome, equipment distributors, Philadelphia.



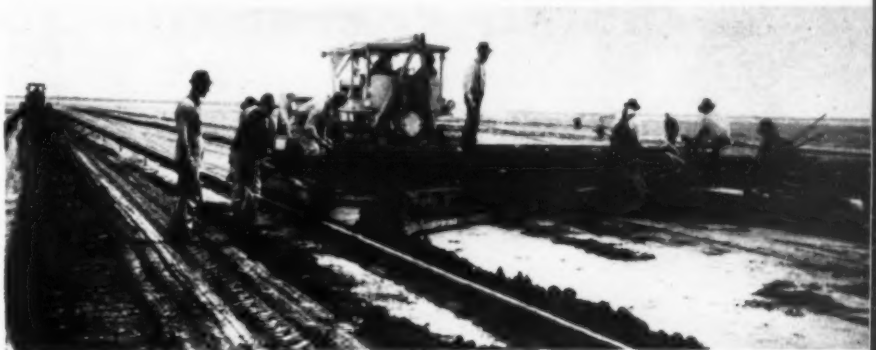
WELDED ANGLE HANGERS (left) support steel girts below Gunit spandrel curtain where girts have been cut to permit column connection to steel frame of new machine shop extension being erected by Rust Engineering Co., Pittsburgh, for Bureau of Yards and Docks, Navy Department, at Norfolk Navy Yard, Portsmouth, Va., where Commander A. K. Fogg is public works officer.



TRACTOR-MOUNTED OVERHEAD SHOVEL (above and below) scoops up spoil at rear and casts it forward over tractor into truck for John Buckley & Co., Philadelphia, excavating contractor on Bartram Village housing project for war workers, West Philadelphia. Note wheel under forward end of tractor to give balanced operation with Sargent shovel. Some contractors use same type of unit with special bucket for pulling stumps.



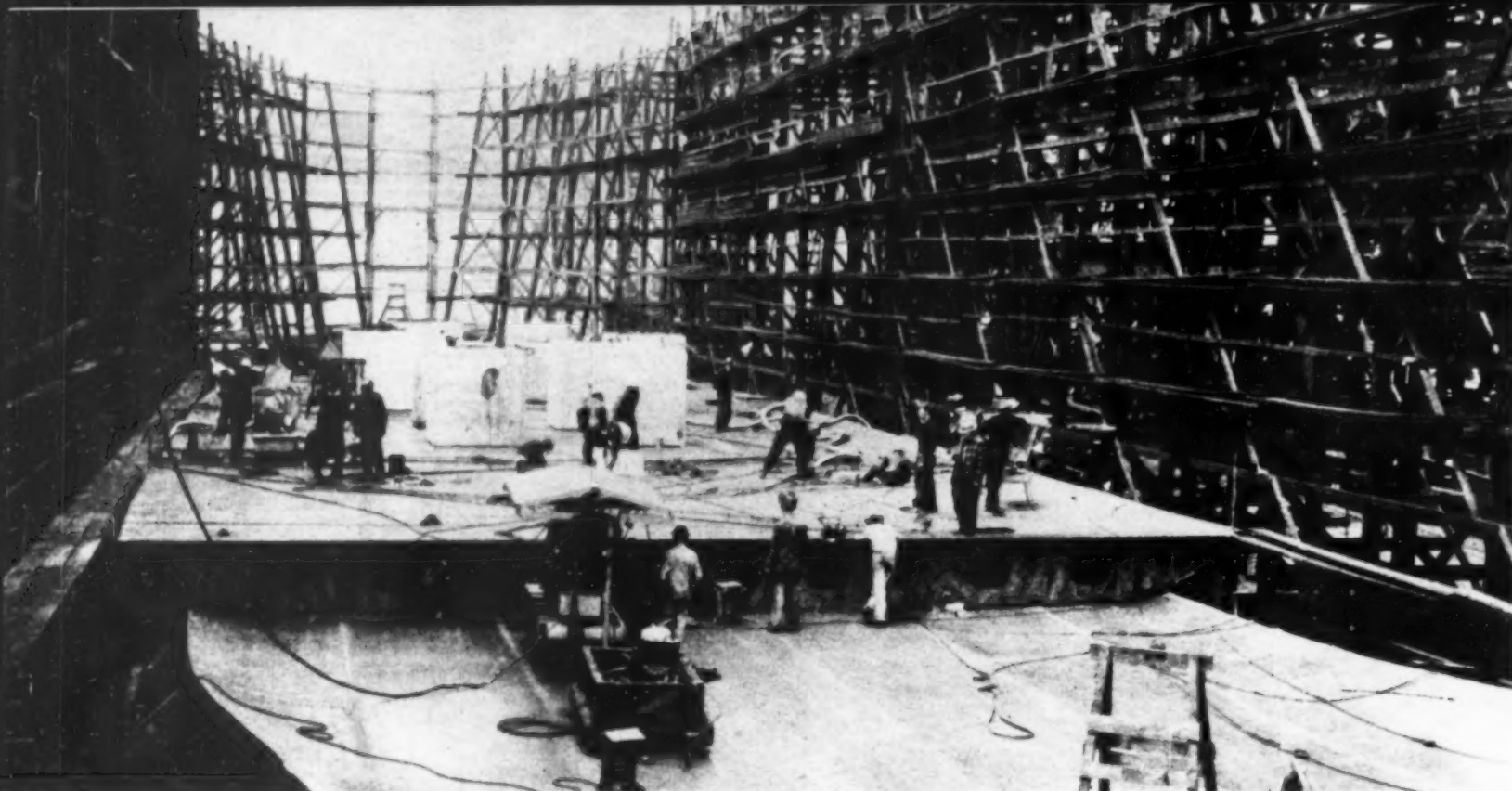
STEEL SCAFFOLDS are used for purpose of shoring concrete forms in erecting engineering building for Chrysler Corp. at Highland Park, Ill., designed by Albert Kahn Associated Architects and Engineers, Inc., of Detroit, and constructed by W. E. Wood Co., general contractor. Advantages of this type of Salway scaffold, engineers of Kahn organization report, are that it is easy to erect and take down, eliminates fire hazard, is lighter, stronger and less costly than wood and offers minimum wind resistance when used outside.



FINE GRADING for Army airport runways at Hill Field, Utah, is done with rig equipped with V-shaped screed blades riding on metal forms for concrete and hauled by tractor. Project is being built under direction of U.S. Engineer Department.

FLEXIBLE TIMBER MAT (below) for levee revetment by U.S. Engineer Department along Sacramento River, between Courtland and Walnut Grove in California, is woven on anchored barge, floated into place, weighted with rock and sunk to prevent bank erosion. Mat is 70 ft. wide and 4,000 ft. long made up of 1x4-in. planks over stringers of heavier lumber. In preparation for sinking of mat, levee bank is graded to uniform slope with clamshell dredge.





BOTTOM PLATES AND INNER-BOTTOM SECTIONS for 10,500-ton steel cargo vessel are assembled on one of ways. Concrete blocks, each weighing 20 tons, are placed to hold sections down during welding operations.

New Shipbuilding Technique

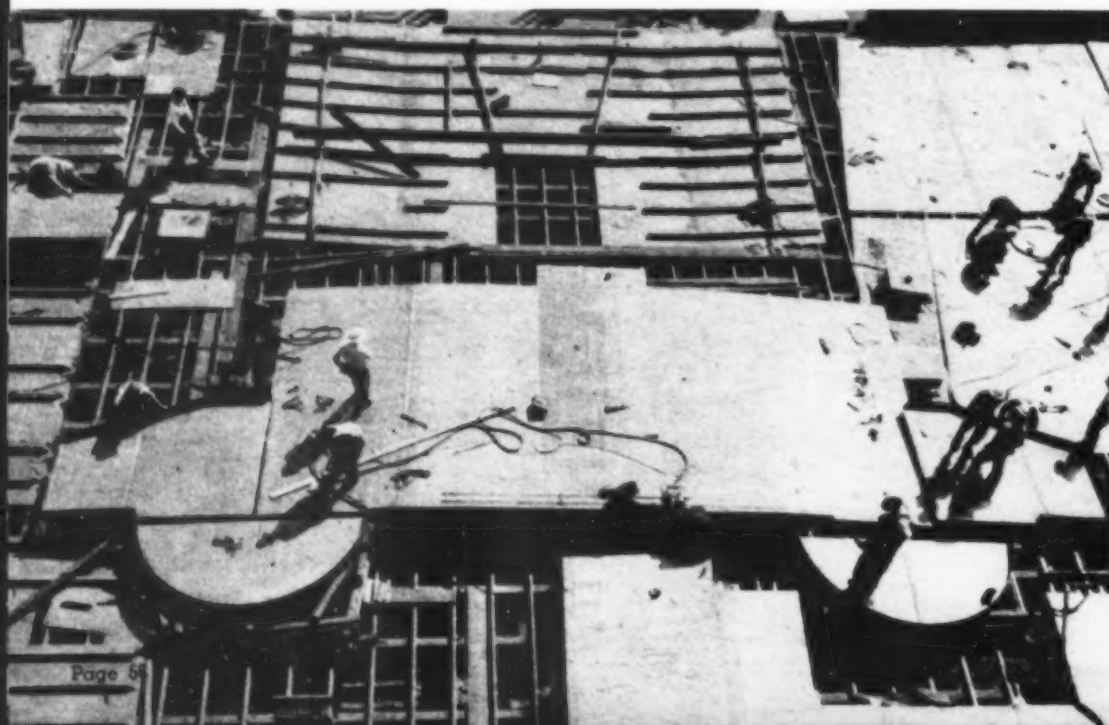
USING PREFABRICATION METHODS, PRODUCES STEEL CARGO VESSELS IN 46 DAYS

By **NATHAN A. BOWERS**

Pacific Coast Editor of "Construction Methods"

ASSEMBLY AREAS (below) are laid out for prefabrication and assembly of sections of ships "ahead of the ways."

(Publication of this article has been approved by U. S. Maritime Commission—Editor)



FORTY-SIX DAYS FROM KEEL-LAYING TO DELIVERY is the record-breaking time—more than five times faster than originally specified—in which the Oregon Shipbuilding Corp., staffed with men from the construction industry in many of its key executive posts, is producing for the U. S. Maritime Commission 10,500-ton steel cargo vessels 420 ft. long at its yards near Portland, Ore. By the use of special prefabrication methods, welding instead of riveting, upside-down assembly to facilitate welding of sections weighing as much as 53 tons, and other innovations, the contractor has outmoded traditional methods of ship construction. In an effort still further to step up production, the shipbuilding company is making radical changes and

improvements in the layout of its 11-way yard employing more than 30,000 workers, and is adding a 240x855-ft. assembly shop to its existing facilities.

On May 22 a period of 60 days was the fastest time in which a ship had been built and equipped, 43 days being required for work on the ways and 17 days at the outfitting dock. The subsequent 46-day speed record for completing a ship was established after the following notes had been prepared. In comparison with this 46-day schedule, it required an average of 309 days to complete an 8,800-ton Emergency Fleet Corp. vessel during the first World War in 1918.

Yard Operations Dispersed—Dispersion of operations in yard "areas" laid out to avoid interference in production effort, prefabrication and assembly of ships' parts in shops, instead of concentrating all activities on the hulls as they are built up on the shipways, and the extensive use of welding, instead of riveting, for making joints, are credited as the major reasons for the unprecedented shipbuilding speed being attained. By thus spreading out the work, a



JUST INSHORE FROM LAUNCHING WAYS are assembly areas and plate shop. Areas are separated by roadways used by trucks and spanned by gantry cranes.

eleven 75x240-ft. bays of the huge structure. Materials move in at the end of each bay, are fabricated or assembled by production-line methods, and are delivered in completed form to storage areas at the other end, thus insuring a

steady flow of assembled parts for incorporation in the hulls on the shipways. As shop operations are now departmentalized, the first three bays are used exclusively for inner bottoms, bulkhead sections and other large parts.

Assembly "Areas"

In the yard layout two other important centers of activity are the assembly "areas" and the plate shop. An assembly area is located ahead of each launching way to provide ship-side storage and space to apply the finishing touches to each hull. In each of these areas, as in the assembly shop bays, there is provided, in place of floors, a supporting timber frame-work surmounted by steel I-beams on which parts are set for welding. Welding, incidentally, has replaced nine-tenths of the riveting formerly required for ships of this type. There is ready access to the under side, as well as to the surface, of this framework. The framework is built up of 12x12-in. timber sills and 10x14-in. stringers carrying 4-in. steel I-beams



STEEL INNER BOTTOM (left) section is turned over by gantry crane to expedite welding on other side.



PAIR OF CRANES (below) team up to place a prefabricated steel deckhouse section.

far larger number of men can be utilized than was possible under former methods which limited the number of workers to those that could operate effectively on the individual hull under construction on the ways.

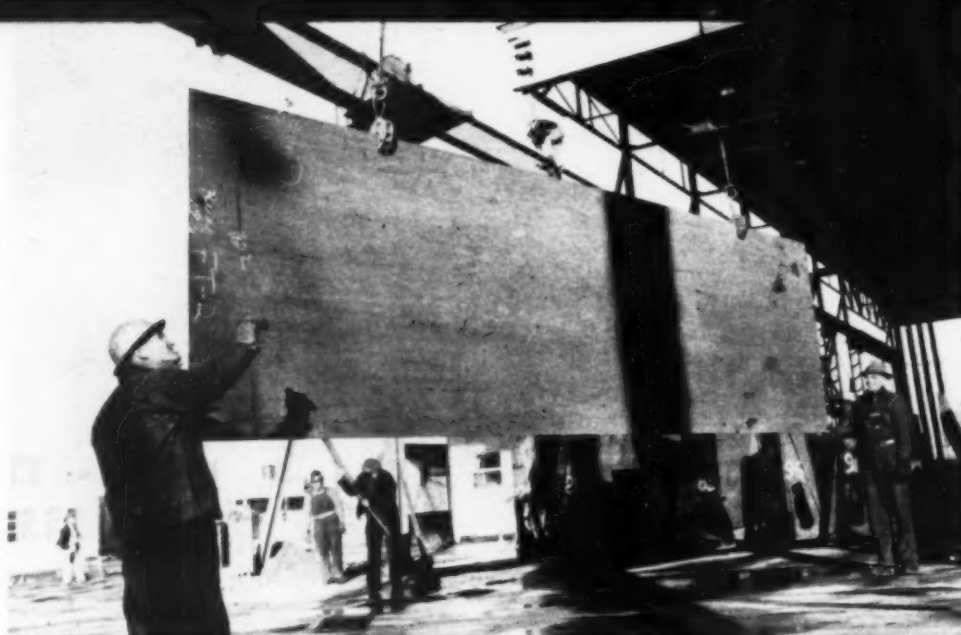
Another feature of the new shipbuilding technique is the assignment of workers to specific tasks, so that they become production-line specialists in performing their respective duties at top speed. This result is accomplished in the new 240x855-ft. assembly shop by classifying operations so that only certain ships' parts are fabricated in each of the



on 2-ft. centers, designed for loads of 350 lb. per sq.ft. On this support the underside of a large steel part can be tack-welded and temporary stiffeners can be attached, as welders have access to all parts of the under surface. Only minor welding operations, however, are done from below. Plate seams are made by the automatic welding process and for final welding the large assemblies are turned over to obtain maximum welding speed and efficiency.

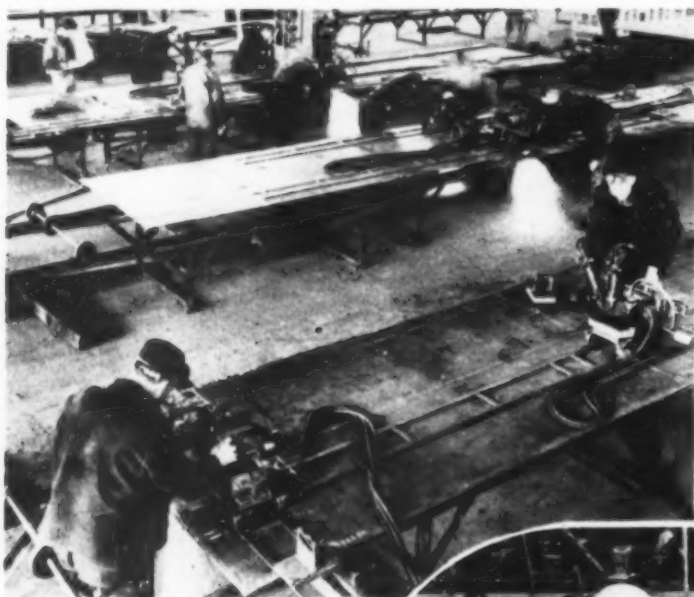
Plate Shop

In a 170x470-ft. plate shop, steel plates are trimmed, bevelled on roller tables, and drilled or punched for rivet holes, where needed. A pantograph with four oxyacetylene burners on a cantilever arm make it possible to cut four



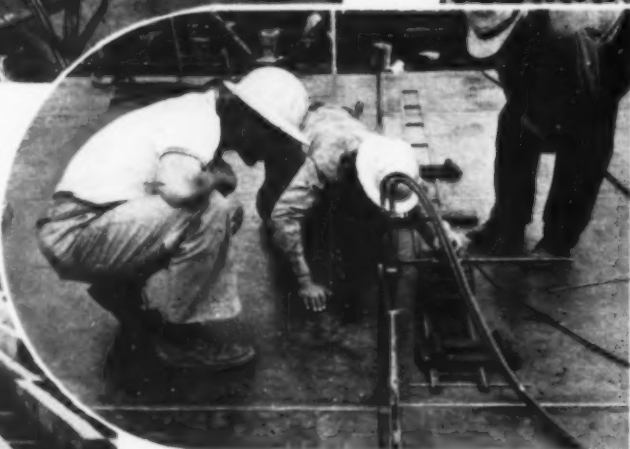
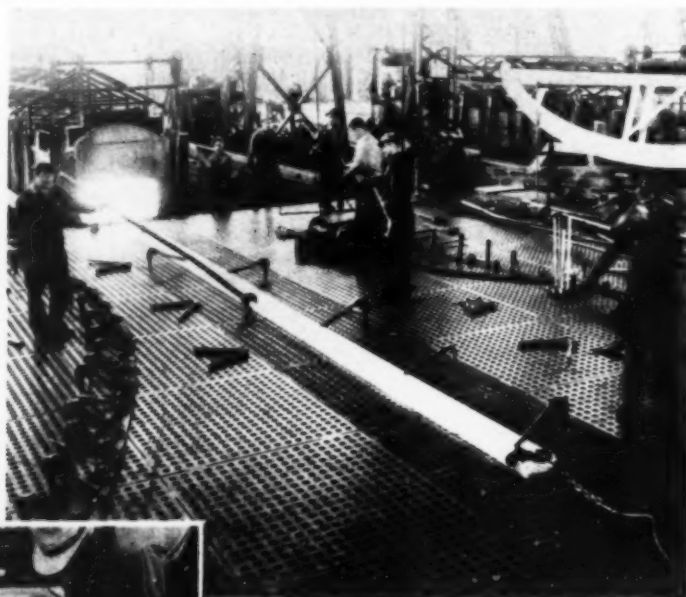
STEEL PLATES for 10,500-ton cargo vessels are lifted by toggle clamps.

TRIMMERS (below) cut steel in plate shop with torches mounted on carriages. Work moves ahead on roll tables.



IN ASSEMBLY SHOP (below), measuring 240x855 ft., floors are made of 10x14-in. stringers resting on 12x12-in. sills; they are surmounted only by 4-in. I-beams, spaced 2 ft. apart (not yet been placed when this picture was taken).

BEVEL-OPENING PROCESS (below) is applied to steel channel frame member; channel then is bent to hull curve against template at left



OXYACETYLENE TORCH mounted on traveling carriage trims ship's plates.

steel shapes simultaneously from a full-scale pattern drawing on paper spread on a floor over which the governing point of the pantograph moves.

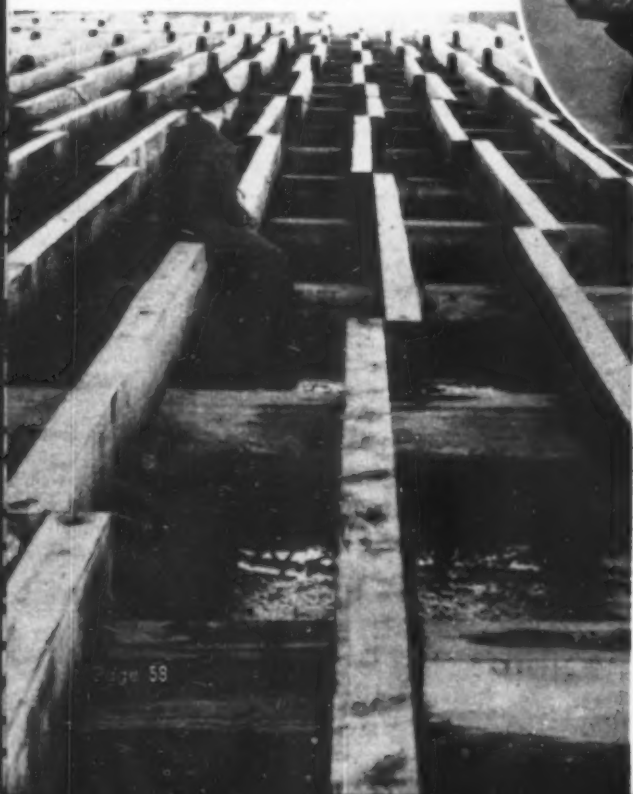
Although punch presses in the shop are available for handling plate thicknesses up to 1½ in., most of the holes, even in light plates, are formed by portable drills, which do not leave a burr on the underside of the plate, and eliminate moving and handling the plate

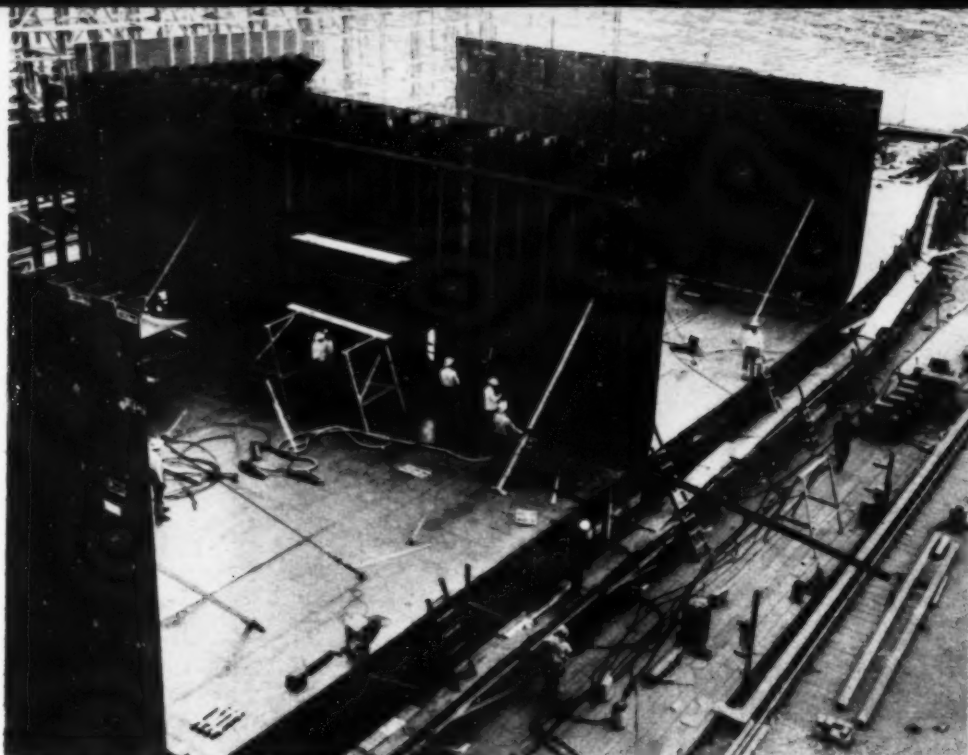
at the stationary punch press. The plate shop also is equipped with furnaces for heating channel irons which are shaped to form the ship ribs by bending with a pneumatic ram against templates wedged to the floor.

Transportation is an important feature of the yard facilities. Standard-gauge railroad tracks connect all parts of the yard, trucks and trailers are available with capacities up to 60 tons, and small loads of steel plates or parts are picked up by carriers, adapted from the overhead-powered type of vehicle known as "lumber-carriers." For the heavier lifts there is generous provision of revolving cranes of 20 to 50-ton capacity on towers 30 to 60 ft. high.

Between the ways are revolving gantry cranes on 60-ft. towers that have a rated capacity of 42 tons at 40-ft. boom. These cranes run the entire length of the ways, as well as along the adjoining assembly areas. Two adjoining cranes often combine to handle a heavy part for the ship that lies between them.

Six revolving cranes that serve the





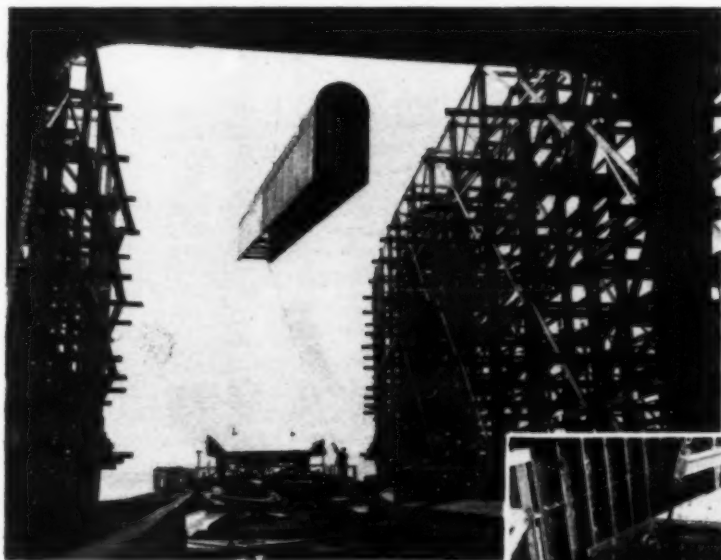
HUGE STEEL BULKHEADS, after preassembly, are placed as units transversely on inner bottom.

to the hull. Typical of this procedure is the foundation and framework where the boiler assemblies are put together. Instead of working in a confined space down in the hull, this intricate assembly operation is done in a part of the yard readily accessible to materials and labor and where there is ample room for fitting and testing the parts. The completed 37-ton boiler assembly is then lifted to a 50-ton trailer and moved out to the assembly area at the head of the way. Here it waits for the revolving crane to pick it up and place it in the hull at the exact moment when its arrival will best fit into the assembly scheme.

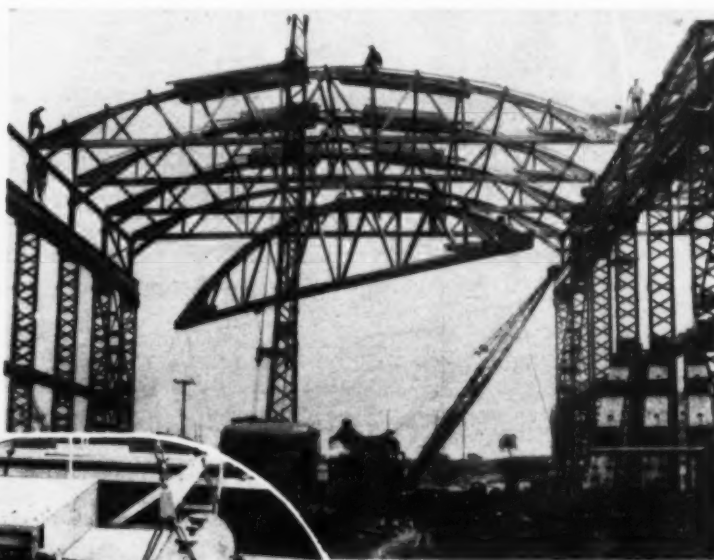
With this general set-up, the heaviest parts that have been handled to date are the 53-ton inner bottom sections that are placed on the ship by two of the big revolving cranes working to-

(Continued on page 122)

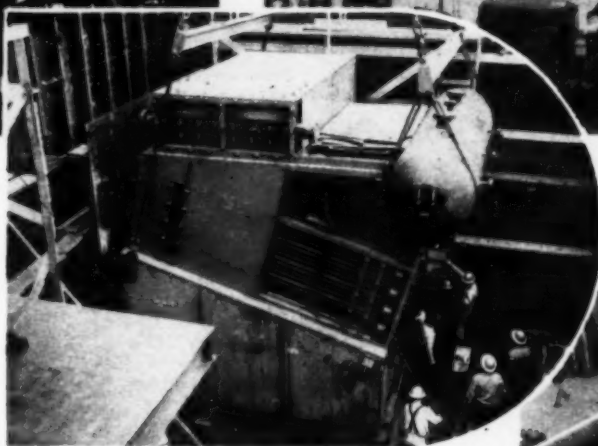
TIMBER ROOF TRUSSES (below) of 77½-ft. span for new assembly shop are raised by cranes to points of support on steel columns which also carry crane rails.



PREFABRICATED SECTION (above) of propeller shaft tunnel 56 ft. long is lifted bodily into hull.



IN OUTFITTING YARD (below) mast and boom assembly operations are in progress.



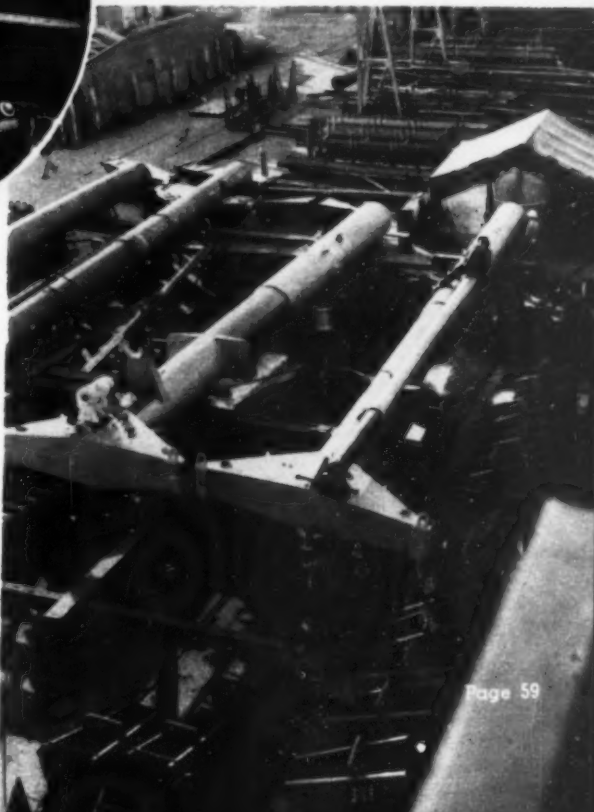
ASSEMBLED BOILER UNITS weighing 37 tons are lowered into place.

2,000-ft. outfitting dock have booms that can reach not only the vessel moored next to the dock but can also deliver to a ship moored "two deep" on the outer side. Four revolving cranes serve the plate storage area. Another, operating on tracks along the delivery end of the assembly shop, has a capacity of 50 tons at 60-ft. boom. The overhead cranes in the several bays of the assembly shop, all of 75-ft. span, have capacities of 25 tons in the first two bays where heavy parts will be handled, and 10 to 20 tons in the other bays.

Perhaps the most universal lifting service in the yard is performed by the truck cranes on rubber tires whose mobility enables them to go wherever they are needed. About 15 of these cranes of different sizes and capacities (such as could be obtained on short notice) constitute the utility fleet that handles plate

in the storage yard, helps assemble parts that are added or are put together in the assembly areas, save the time of the big revolving cranes and avoid delays in many places where lifts have to be made on short notice.

About 50 percent of the steel tonnage in the ships is assembled "ahead of the ways." Also, nearly all of the separate units are put together before they go



ARMY ENGINEERS RUSH PIONEER ROUTE FOR

Alaska Highway



ROAD-BUILDING CREW of Army Engineers hacks pioneer route through thick growth of poplars north of Fort St. John, B. C., as officer in "jeep" inspects operations.

With World Photos

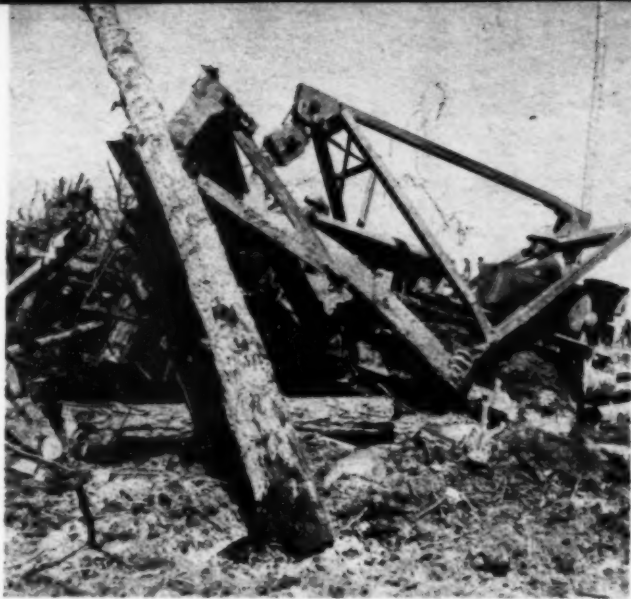


LIEUT. COL. ALBERT L. LANE, in charge of advance construction, loils mosquitoes with netting draped from hat as he studies location map.

TO PROVIDE ACCESS THROUGH THE NORTHERN WILDERNESS for the delivery of men, materials and equipment needed for the construction of the Alaska Highway, 1,400-mile strategic route jointly approved by the United States and the Canadian governments, Army Engineer construction crews, under the command of Brig. Gen. William M. Hoge, are rushing work on sections of a 9-ft. wide pioneer or "tote" road, as a necessary preliminary to building the 24-ft. wide gravel-surfaced permanent highway. Active on the job, also, are engineers of the Public Roads Administration, headed by J. S. Bright who is serving as district engineer in charge of construction under the direction of Dr. L. I. Hewes, chief of the PRA's Western Region. While the Army Engineers have been at work on the pioneer road, the Public Roads Administration has already let major contracts for the main highway, including a 155-mile section to F. C. Lytle, of Sioux City, Ia., and the Green Construction Co., of Des Moines, Ia., and a 200-mile length to the Okes Construction Co., of St. Paul.



COL. I. A. O'CONNOR, supervising southern end of route, sends orders to construction crew through radio transmitter installed in truck.



TOUGH GOING is encountered by tractor-bulldozer outfit in clearing tangled undergrowth.

ROAD BUILDING EQUIPMENT (below) for use on Alaska Highway is unloaded at railhead in Dawson Creek, B. C.

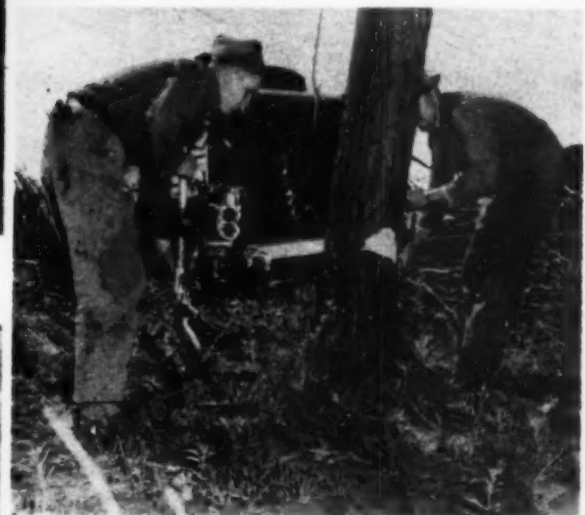


LEANING-WHEEL BLADE GRADER (below) shapes roadbed through section of line from which poplar trees have been cleared.



A SWATH IS CUT for pioneer road through dense growth of white poplars north of Fort St. John.

AIR-OPERATED SAW (below) speeds job of clearing trees from right-of-way



ANALYSIS OF Shovel Cycles

WILL ENABLE CONTRACTORS
TO INCREASE OUTPUT AND
DECREASE REPAIRS

By F. C. RUHLOFF

Engineer

Bucyrus-Erie Co.,

South Milwaukee, Wis.

THIS ARTICLE proposes to point out fundamental factors of power shovel operation which must be considered if maximum production with minimum maintenance delays is to be obtained. With increased hours of service, increased repair costs are to be expected; but the rate of increase may be con-

trolled in all classes of material if the shovel is applied and operated properly. An analysis of the functions of the machine during an operating cycle may lead to a better use of the power shovel.

Output is of prime importance, and high output obviously will help to make the unit cost per cu.yd. more favorable. High output with low maintenance cost is dependent on using the power of the shovel to its best advantage. The output of any excavator is established by the number of pay yards in each dipper load and the number of dipper loads which the excavator delivers per day.

Pay yards in the dipper are dependent on several factors varying with the

material which is being loaded. In certain types of material, a properly designed shovel can thrust its dipper into the bank and fill it in a short digging stroke with minimum disturbance of the material from its natural state. This avoids swell of material, which has important bearing on pay yards.

In other types of material it is necessary to prepare by blasting the material to be loaded. Proper and uniform shattering of the material permits a full dipper load, whereas poorly shattered material will only partially fill the dipper, and hence each load carries less yardage of solid bank measure.

The number of cycles of a shovel are dependent upon: (1) the initial speed of the machine and (2) how the several functions of digging, hoisting, thrusting, dumping, swinging, and lowering are used and coordinated. Much has been said about cycle time, but too often proper analysis is not made to determine when any particular cycle by any shovel is too fast or too slow. Spurts of fast cycle operation may by the end of the day, as a result of delays and shutdowns, show a lower daily production than can be obtained by a machine operated at a steady, uniform, rhythmic cycle performance.

Graphic Records of Typical Shovel Cycles

An endeavor will be made to analyze a typical shovel cycle by studying the power input of an electric excavator, because on this type it is possible to obtain by recording instruments both the time and power input factors for each independent function. In general, the elements recorded are applicable to internal-combustion-engine excavators, with the possible exception that on the

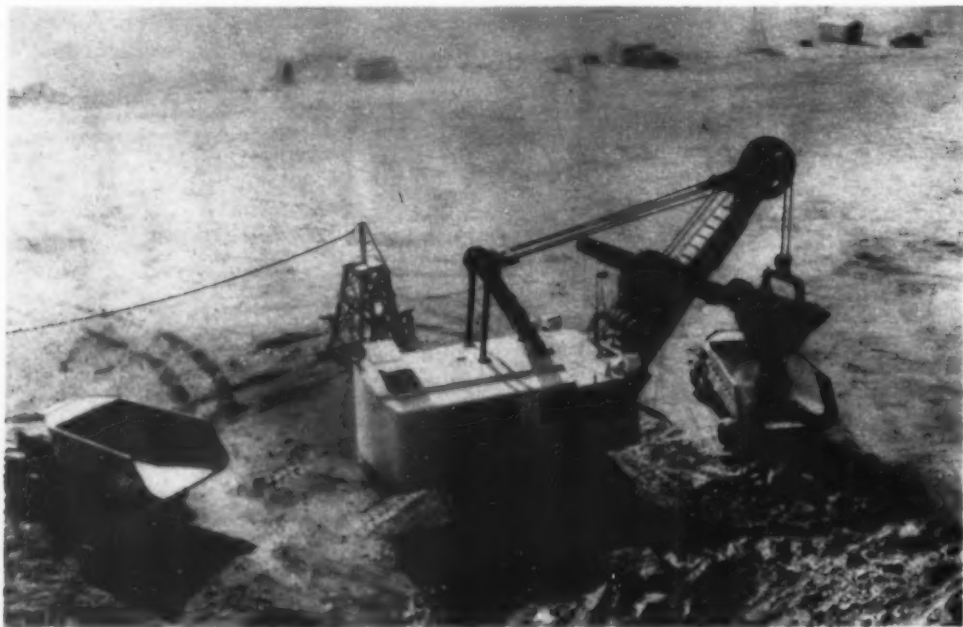


Photo 1 . . . BY FACING BANK, shovel can load trucks at either side, and empty truck is able to back into loading position while another unit is being filled. Note clean, level floor kept in ideal condition for trucks by bulldozer which pushes leather edge of cut up toward face.

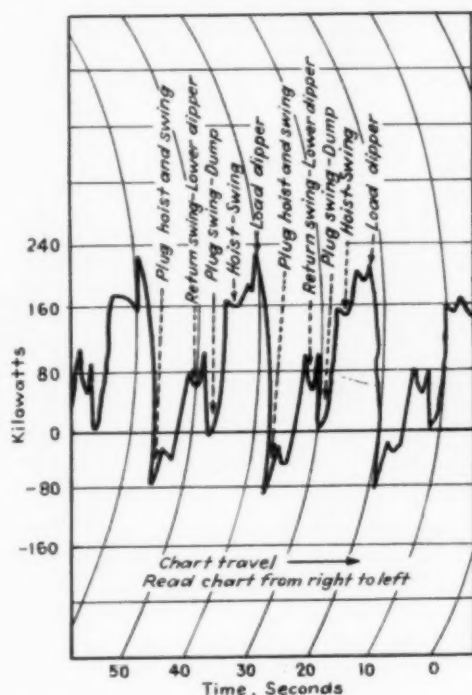


Fig. 1 . . . POWER INPUT registered by watt-meter on electric shovel shows recurrent peaks on successive cycles for digging, hoisting and swinging. These peaks are characteristic of all shovels, whether operated by internal-combustion engines or by electric motors. Portion of curve below zero line represents power involved in plugging hoist, thrust and swing. On Ward-Leonard electric shovel, this power is captured and pumped back by regenerative braking. On internal-combustion-engine shovel, same power must be dissipated by braking hoist as dipper is lowered and by plugging swing; volume of this power indicates importance of proper braking and plugging in shovel maintenance.

Ward-Leonard (variable-voltage-control) electric shovel there is regenerative braking and regenerative plugging which are virtually energy pump-backs. In an internal-combustion-engine excavator such gains are not obtained; instead, similar energy is dissipated by the lowering brakes and by plugging of the swing clutches.

Typical cycle graphs are presented which show the power input required during the digging stroke, in which both the hoisting and thrusting forces are combined to provide digging effort; the influence on power input of the swing load which occurs while the dipper is being hoisted above the bank; the nature of the plugging of the swing prior to dumping, the acceleration for return swing, the combining of the lowering with the swing, and the return to digging position.

A continuous kilowatt power input curve of a shovel is shown in Fig. 1. As the chart travel is from left to right, this curve is read from right to left. Note the characteristic recurrence in each cycle of power input peaks to load the dipper, to hoist and

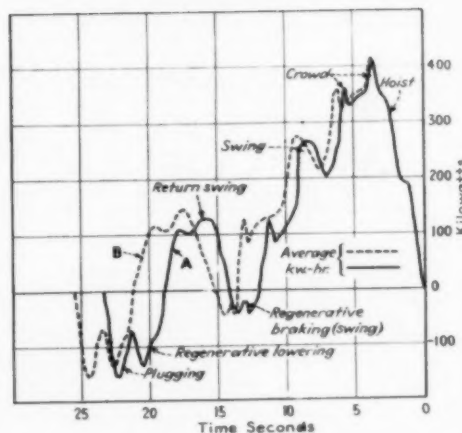


Fig. 2 . . . POWER REQUIREMENTS for individual motions of shovel cycle vary with mode of operation. Small increases in hoisting, thrusting and swinging efforts cause appreciable increases in operating time and power consumption, as indicated by two curves and following table for Case A and Case B:

	CASE A	CASE B	PERCENT INCREASE
Time per operating cycle, sec.	23.3	25.5	9.4
Kwh. per operating cycle	0.75	0.89	18.7
Average kw. during cycle	116	125	7.7
Kwh. per cu. yd. (4 cu. yd. per cycle)	0.187	0.222	18.7

swing, and to return swing. Note also that the lowering of the dipper and the plugging of the hoist and swing prior to starting the next cycle show a decrease in power required and further that the plugging loads are below the zero line, indicating regenerative braking.

To consider the elements of a single cycle in detail, Fig. 2 should be noted. This curve pertains to a larger shovel where the cycle time is longer; it was selected to show more clearly the component parts of a cycle.

Fig. 3 was plotted from similar curves taken from a 30-yd. shovel. On this curve the power inputs to the hoist motors, the swing motors, and the thrust or crowd motor are separately indicated. This curve is somewhat simplified, but in general it follows the characteristic

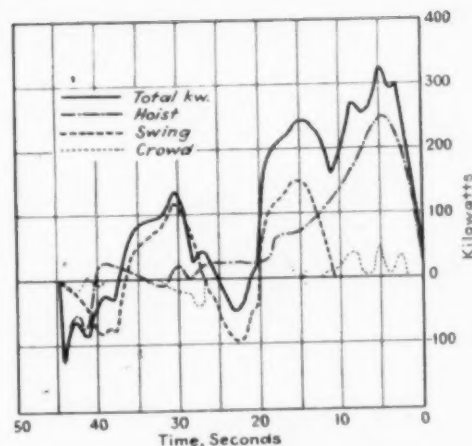


Fig. 3 . . . CUMULATIVE EFFECT of overlapping individual motions on total power consumption is indicated by plotted curves for large electric shovel. Note how thrusting effort input adds to peak input to hoist motor. In single-engine unit, engine must increase its power to overcome additional load imposed by crowding dipper.

cycle outline shown in Fig. 1 and 2. The solid line indicates the total power input, and the power of the several units is shown by the various dot and dash lines. Note in particular how the thrusting or crowding effort adds to the peak input to the hoist motor.

In internal-combustion units where there is but one prime mover, it is more difficult to get power input curves of the separate functions, but since the work the machines do is about equivalent, these exhibits may be taken to represent generally the work done by each separate shovel unit and its occurrence during a cycle. Note particularly the fact that a certain percentage of the curve is below the zero line; on an internal-combustion-engine excavator this part of the curve would correspond to the free lowering of the dipper, which must be checked by the lowering brake and the plugging to check swing. It seems obvious that the manner of braking and plugging a machine will have a material influence on the repairs and maintenance of the unit.

Severity of brake application and its influence on the shovel have been quite definitely established by strain-gage tests with a machine in crane service, where the sudden application of a brake to check a lowering load has increased the strain or pull on the rope to two and one-half times the load being lowered. This sudden increase of load will rock the machine on its caterpillars, thus indicating that this sudden increase in strain is being transmitted from boom-point sheave throughout the machine down to its mounting. It is such sudden application of brakes, clutches, or plugging of swing and thrust motors which must be avoided if

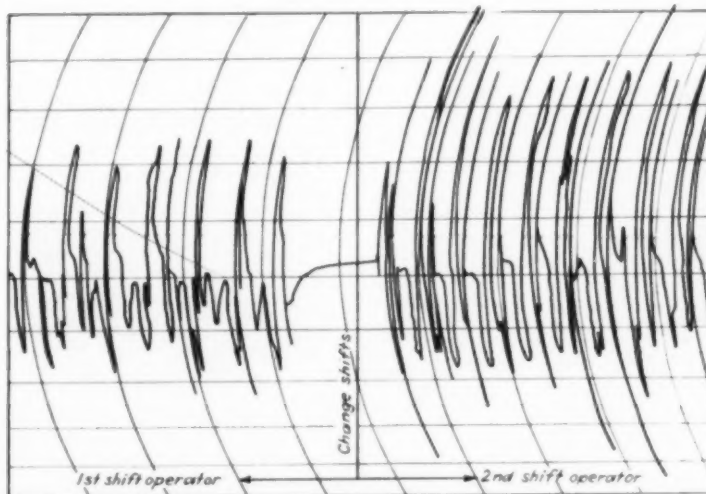


Fig. 4 . . . PROPER HANDLING OF CONTROLS gives smooth operation of large dragline on first shift, as shown by power input curve at left, while bruising operation indicated by peak power rushes on second shift, at right, produces no increase in output but leads to larger maintenance and repair costs.

***LICKING* ANOTHER**



... OVER 200 ALLIS-CHALMERS TRACTORS ON ONE HUGE SOUTHWEST PROJECT

A vast array of mechanized might is winning another race against time, on another ordnance project—one of the largest, perhaps one of the toughest! Faced with a time limit, long hauls and 5 to 6 feet of muck removal before making cuts and fills... officials in charge found they needed equipment with plenty of power for the tough hauling, plenty of speed for the long pulls. Over 200 A-C tractors, together

with 102 Gar Wood scrapers and other Allied units were rushed in to take over the brunt of the attack. Put on a three shift, 7 day a week basis, they are building mile after mile of road, handling grading for the railroads, laying the groundwork for the buildings! On every project, of every size, at home and on the fighting front—you'll find these mechanical soldiers of war hurrying the day of peace!



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< HUGE ASSEMBLAGE OF FIGHTIN' POWER!
Shown here is a part of the big, fleet of Allis-Chalmers tractors and Gar Wood scrapers. In all, there are over 200 A-C tractors, 102 Gar Wood scrapers, motor graders, bulldozers, engines and other allied equipment.



^ BORROW PITS GO STRAIGHT DOWN!
The borrow goes unusually deep on this project to save time and money stripping a wide area of the 5 to 6 foot covering of spongy muck. The tough-loading, sandy-clay borrow is heaped-up in the Gar Wood scrapers with the powerful, 2-Cycle Diesel tractors.

< Handling by far the greater part of the bulldozing work are 2-Cycle Diesel tractors equipped with Gar Wood and Baker bulldozers.

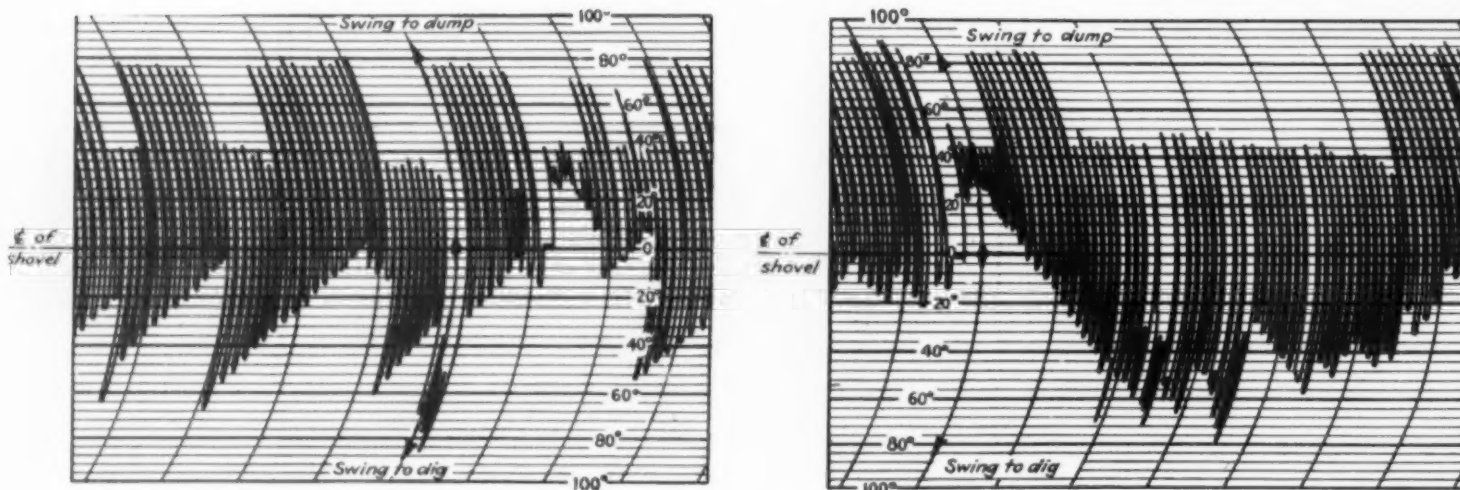


Fig. 5 . . . TO OBTAIN BENEFITS of rhythmic cycles for smooth operation and maximum output, hauling units are spotted at proper positions to maintain uniform swinging angle as shovel excavates various portions of cut face. Curves indicate angular swing of shovel as it loads successive vehicles.

maintenance delays and costs are to be kept at a minimum.

A study of these graphical cycle records will show the accumulative nature of small and often disregarded operating factors. The dotted curve for Case B in Fig. 2 shows that for small increases in hoisting, thrusting, and swinging loads an appreciable increase in operating time, power input, and power consumption per cubic yard is brought about.

Swinging with the dipper handle fully extended will always register both in time and in power required. Since the area under the curve represents work done, it follows that operating cycles registering small areas represent a minimum of work done to obtain a dipper load. This means less power used and less wear of machine parts. In the example shown, the increase is due almost entirely to a greater WR^2 of the swing load. It reflects an 18.7 percent increase in kwh. per cu.yd.

An extreme case of peak power input rushes is represented by Fig. 4. This curve, taken on a large dragline, shows the characteristic cycles that were obtained at the end of one shift and at the beginning of the next shift and records the operating tendencies of two operators. It will be noted that the peaks are pronounced during the curves at the start of the second shift. These peaks were entirely unnecessary. This "rugged" operation did not increase the output nor decrease the cycle time. The curve is presented because it graphically shows that by proper handling of the controls, a uniform, smooth application of power may be obtained, while improper operation may produce excessive power peaks which are detrimental not only from a power input standpoint but also from a repair and maintenance cost standpoint as well.

The swing angle of the machine determines to a large measure the total cycle time. With modern truck loading,

the practice of having the shovel face the bank and load trucks on either side, as shown in Photograph 1, has been established. In this way the trucks and shovel are always in a position to move away in the event of a slide, and, while the shovel is loading one truck, the other truck is backing into position. This photograph shows an ideally kept, level floor for which a bulldozer is used to clean up and push against the bank the feather edge of the cut, thus maintaining a good roadbed for the trucks and at the same time avoiding the necessity of the shovel's doing clean-up work.

We have spoken of rhythmic cycles: Fig. 5 shows a graphic representation of the angular swing of a shovel and the regular occurrence of the shovel cycles. That portion of the curves below the zero represents swings to the right, and that above, swings to the left. The swings to the right indicate the digging portion and show the manner in which the shovel worked across the face, and

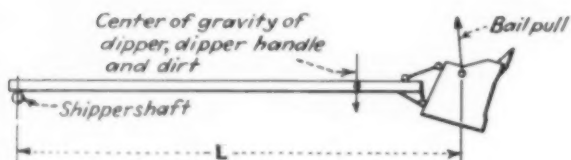


Fig. 6



Fig. 7

Figs. 6 and 7 . . . AS DIPPER HANDLE is crowded forward, center of gravity of combined load (made up of dipper, dipper stick and dirt) moves farther from fulcrum at shipper shaft, requiring larger portion of available bail pull to lift dead weight on lever arm.

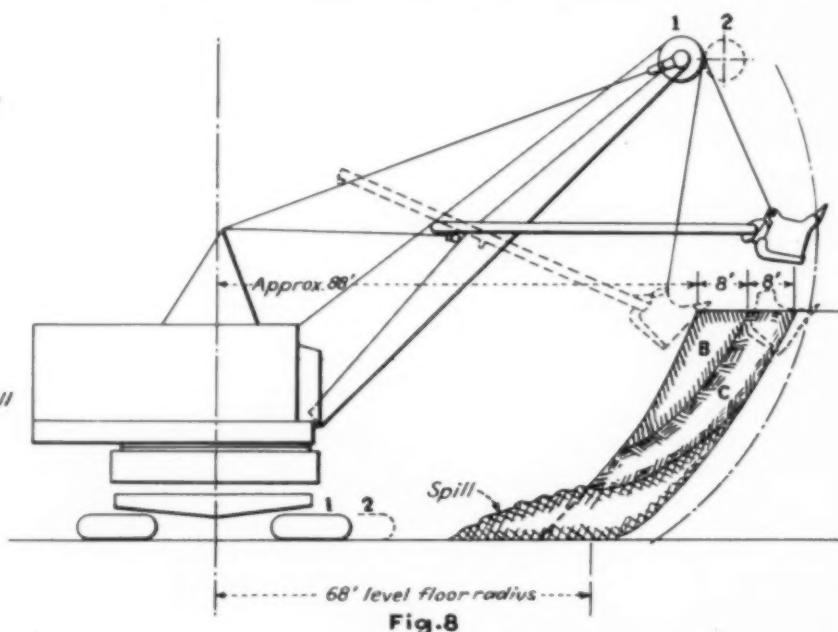


Fig. 8

Fig. 8 . . . USING SHORT DIPPER STICK, shovel makes cuts B, C and A in that order, moving up to position 2 for cuts C and A. This method of digging bank in three zones with short stick offers several advantages discussed in accompanying text.



Photo 2 . . . GOOD SHOVEL POSITION for digging and swinging permits rhythmic cycles which give maximum daily production at lowest cost per yard with least wear on shovel parts.



Photo 3 . . . BY SPOTTING HAULING UNITS at proper points to load spoil from successive digging sections of face, shovel is able to maintain uniform digging and swinging rhythm conducive to maximum output and minimum shovel repairs.

those to the left show dumping to a definite spot. Obviously, in decreasing the angle of swing, the total cycle time may be decreased.

There is a certain angular swing which is required to accelerate a machine from rest to its uniform swing speed; the retardation angular movement is usually one-half of that required for acceleration. Between these points uniform swing occurs, and it is during this section of the swing angle that cycle time may be saved. In this example the length of the arc of swing was kept about uniform by changing the loading or dumping position. Good swing and digging positions of shovels are shown in Photographs 2 and 3.

Digging Effort of a Shovel

The digging effort of a shovel is the resultant force set up by the hoist pull, the thrusting or crowding force and the angle between them. Excessive crowding of the dipper into the bank, although it has a desirable influence on dipper pay yards, may be so great as to necessitate use of greater bail pull than required for the particular digging and may be too severe from a maintenance standpoint. Therefore, the operator should question his performance in order that he may obtain the desirable balance between output, expended effort and final costs.

Importance of the position of the shovel during the digging stroke should not be overlooked. With a given bail pull and thrusting effort resulting in a digging force, the strains on the shovel will vary with the distance to which the dipper handle is extended. Working al-

(Continued on page 106)



Photo 4 . . . DIGGING POSITION is as important for $\frac{3}{8}$ -yd. shovels as for larger units. Use of short dipper stick with resulting favorable digging angle between hoist rope and dipper handle provides maximum digging effort.

Photo 5 . . . EXTENDED DIPPER HANDLE (right) cuts down effective digging force exerted by bail-pull rope in lifting dipper teeth through cut. Principle applies to all sizes of shovels, including $\frac{3}{8}$ -yd. machine digging this bank.



Present and Accounted For...A PAGE OF PERSONALITIES



ALASKA HIGHWAY BUILDERS HAILING FROM IOWA and recruited from membership of Central Branch of Associated General Contractors of America by O. W. Crowley, executive secretary, are organized by C. F. Lytle Co. of Sioux City and Green Construction Co., of Des Moines who were awarded contract to construct 330 mi. of 1,500-mi. strategic route linking Edmonton, Canada, and Fairbanks, Alaska. Top row, left to right: CLYDE ELLIOTT, of Independence; WM. P. GRAVES and KENNETH W. GRAVES, Graves Bros. Const. Co., of Melvin; W. R. HORRABIN, Wm. Horrabin Contr. Co., of Iowa City; L. PETERSON, of Cedar Rapids; FRANK A. EASTON, Hughes & Easton, of Council Bluffs; E. W. WELDEN, Welden

Bros., Iowa Falls. Center row, left to right: HANS OSTERMAN, Gus Osterman & Sons, of Ocheyedan; FRANK EBLEN, Eblen Const. Co., of Cumberland; R. A. FINLEY, president, Western Eng. Co., of Harlan; V. L. LUNDEEN, of Montezuma; WILLIS G. SCOTHORN, J. W. Scothorn Const. Co., of Cherokee; and IRA VAN BUSKIRK, of Hawarden. Bottom row, left to right: P. K. DUVALL, Duvall & McKinney, of Logan; E. M. DUESENBERG, of Clear Lake; J. LEO HOAK, of Des Moines; and T. L. SEARS, Sears Const. Co., of Clear Lake. At time picture was taken HERMAN COLE, Ben Cole & Son, of Ames, was in Alaska.



AT CONTINENTAL DIVIDE TUNNEL, Grand Lake, Colo., key personnel of Stiers Bros. Construction Co., of St. Louis, Mo., and U. S. Bureau of Reclamation assemble in front of drill jumbo at west portal. Left to right: CHARLES SWARTZ, shift boss; M. J. GREER and LARRY FINN, engineers, U.S.B.R.; JOHN R. ("Long John") AUSTIN, general superintendent, who set new records recently in driving Carlton drainage tunnel at Cripple Creek, Colo.



FOR INCREASING MEMBERSHIP Southern California Chapter of Associated General Contractors of America receives for second time Cashman Cup. President M. W. WATSON (left) of A.G.C. presents cup to W. J. ESCHERICH, Chapter president, as F. J. CONNOLLY, Chapter Manager looks on.



CONSTRUCTION ENGINEERING AWARD for 1941 by American Society of Civil Engineers went to E. L. DURKEE (left), resident engineer, Bethlehem Steel Co., for his paper "Erection Methods on Baton Rouge Bridge," selected as prize winner by Society's Construction Division.

NEW PRESIDENT of American Institute of Consulting Engineers is MALCOLM PIRNIE (right), New York consultant. Mr. Pirnie is former director and vice-president of American Society of Civil Engineers and before establishing his own office was for long time associated with well-known consulting firm of Hazen & Whipple, specialists in waterworks, water purification and sewage treatment.



Chapter Presidents of Associated General Contractors of America for This Year



Idaho Branch—DAN J. CAVANAGH, of Twin Falls, president of company bearing his name.



Colorado Association of Highway Contractors—CHARLES B. BERRY, president, Hamilton & Gleason Co., Denver.



A.G.C. of Minnesota—O. W. SWANSON, vice-president, Fielding & Shepley, Inc., of St. Paul.



South Texas Chapter—A. E. HINMAN, member of firm of Aikin & Hinman, Corpus Christi, Texas.



Kansas City, Mo., Chapter—LARRY WINN, president, Winn-Senter Construction Co., Kansas City, Mo.



Oklahoma Builders Division—J. E. WALLER, president, Waller-Wells Construction Co., of Tulsa.



A.G.C. of Missouri—R. R. RINEY, member of firm of O'Dell & Riney Construction Co., of Hannibal.



Kansas Contractors Association—WILL H. SHEARS, president, J. H. Shears Sons, of Hutchinson.



Central Branch (Iowa)—E. M. DUESENBERG, president, E. M. Duesenberg, Inc., of Clear Lake.

Mountain Pacific Chapter—CARL ERICKSON, (below), secretary-treasurer, Erickson Paving Co., of Seattle, Wash.



Seattle Chapter—HENRIK VALLE (below), president, Henrik Valle Co., Seattle, Wash.



N. Y. State Highway Chapter—DWIGHT W. WINKELMAN (below), president D. W. Winkelman Co., Syracuse.



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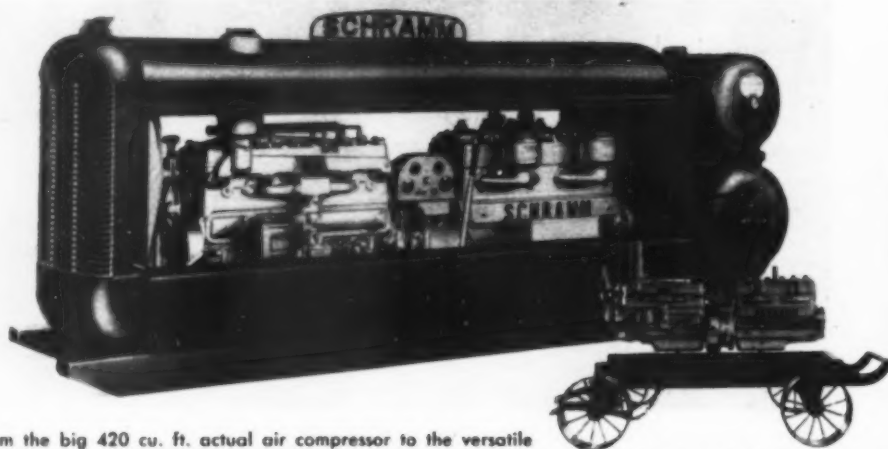
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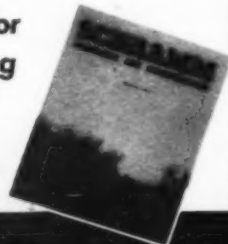


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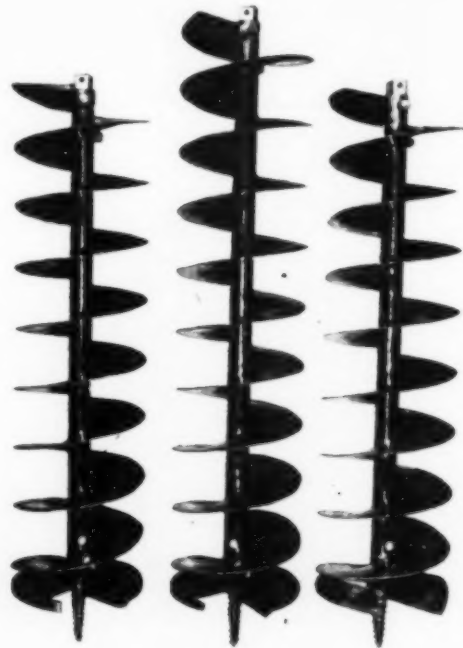
SCHRAMM, INC. WEST CHESTER, PA.

CONSTRUCTION EQUIPMENT NEWS

PORTABLE EARTH DRILL driven by pneumatic rotary reversible drill and operated by two men bores holes 3 to 16 in. in diameter. Standard drills used with power drive come in various diameters and in lengths of 5 or 6 ft., but greater



lengths are obtainable at added cost. Special hardened steel cutting head with adjustable cutting blade below screw is said to allow boring in sand, mud or clay without grabbing. Flight



conveyor brings excavated material to surface. Holes can be drilled vertically or at any desired angle. Useful for drilling test holes to locate gas and water leaks, pole holes and post holes, tree-feeding holes and holes for dynamiting stumps and other demolition work. Advantages claimed for earth drill: quick assembly; easy, economical operation; rapid digging; long life.—**Ka-Mo Tools, Inc.**, 5525 W. Ohio St., Chicago, Ill.

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INFRA-RED DRYING LAMP is said to speed up production of Van Dyke prints 350 percent and to reduce number of rejected prints from 25 percent to zero. In processing, Van Dykes are kneaded in water and fixing baths, then hand-squeegeed on steel roller and finally put through electrically heated



31

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Lorain distributors are out where things are happening—they are our first line of defense to help you do more with what you've got. Acting as *specialized* first aid stations, they are working 24 hours a day to keep equipment at peak performance and to make it last longer. Call on the one nearest you. Here is what he is prepared to do—

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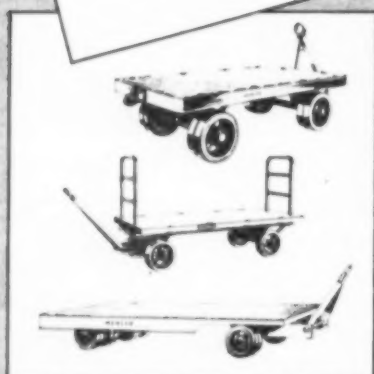


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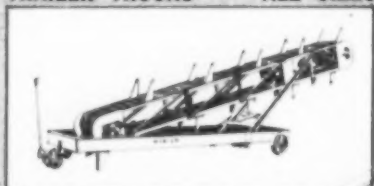
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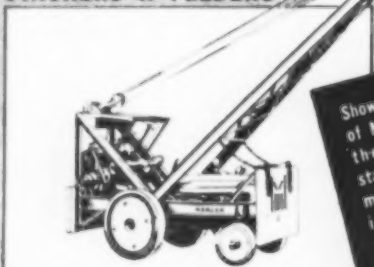
Industrial MATERIAL HANDLING EQUIPMENT



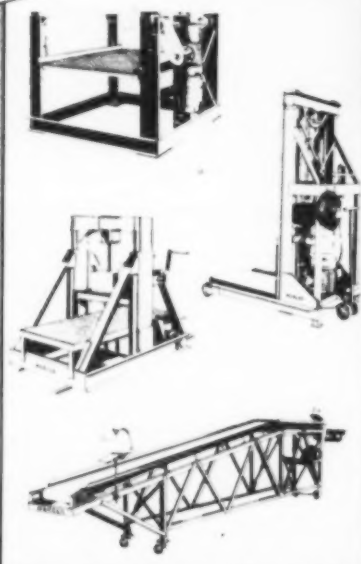
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said to give it sufficient rigidity to serve as self-supporting material. May be used either as permanent or semi-permanent window covering or as interior facing for exterior walls. Although material cannot provide protection against nearby explosions, concussion-absorbing qualities are said to be of value in lessening effects of distant bombings. In addition to incombustibility and shock-absorbing properties, board is said to assure high degree of heat-loss reduction and sound absorption. Makers claim that where large window areas are to be covered, use of glass fiber blackout materials saves 60 to 90 percent of heat ordinarily lost through glass.—Owens-Corning Fiberglas Corp., Detroit, Mich.

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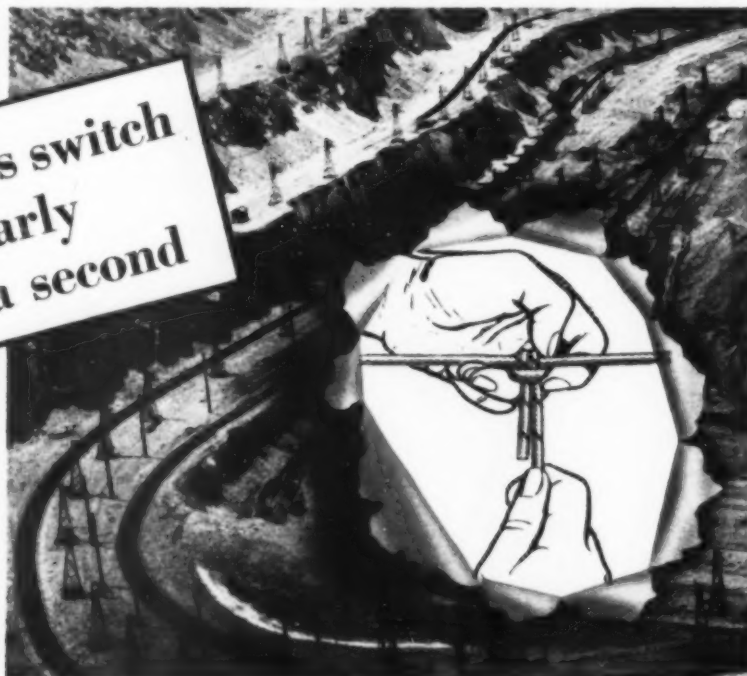
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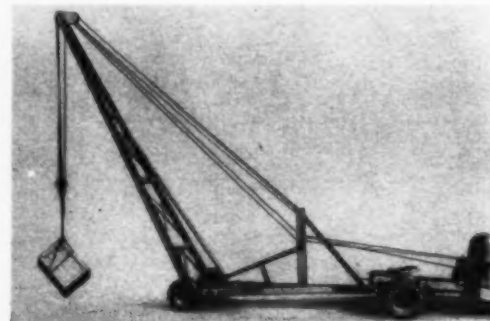
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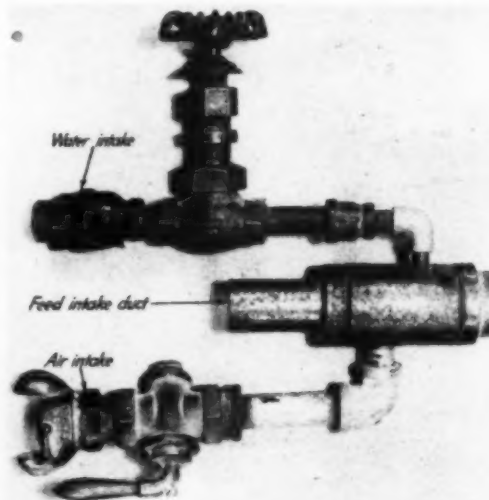
PORTABLE HOIST, known as "Porta Crane" for attachment to truck or tractor is available in three models (2-, 5- and 10-ton capacities) for use in placing machinery, removing or installing motors in tractors, pipe laying, raising and placing building forms, loading and unloading cargoes, handling stone logs, lumber, structural and bar steel and



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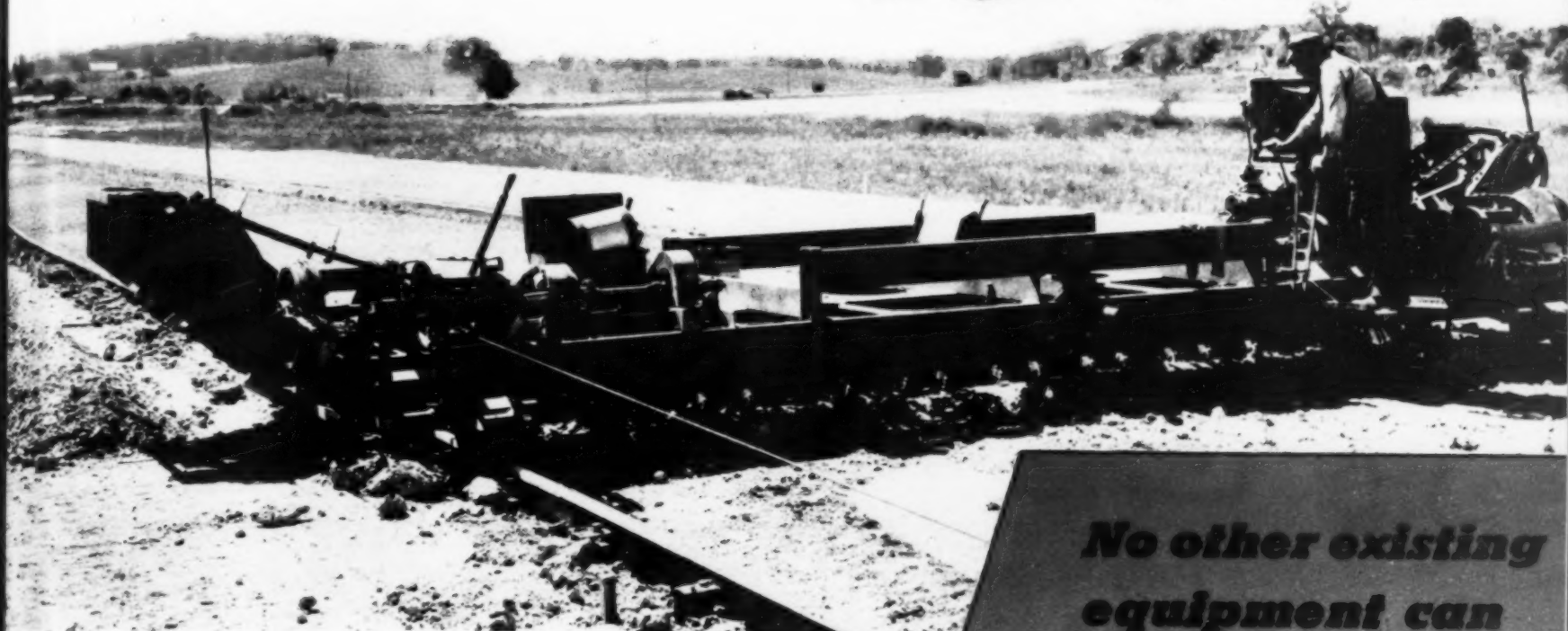
GUN FOR APPLYING SAND-CEMENT MORTAR, known as "BONDact Gun," is claimed by its manufacturers, to be capable of four separate and complete functions: (1) By charging hopper with unmixed sand, gun delivers wet sandblast for cleaning surface ultimately to be "bondacted;" (2) by cutting water supply and operating hopper and air, dry sandblast is obtained; (3) if last process leaves coating of fine dust, water outlet may be opened, feed hopper cut out and with air intake operating, surface may be washed; (4) with hopper and water cut out, air brush is provided. Gun and feed hopper operate on vacuum system. Gun con-



sists of three sections, (1) intake, (2) central operating cylinder; (3) delivery nozzle. Rubber hose forms feed duct connection between material hopper and intake arm of gun. Material is fed dry to hopper, no moisture coming in contact with it until it is subjected to hydration in operative cylinder of gun itself. Compressed air at 80-lb. pressure is delivered through air port to cylinder, picking up in its course atomizing moisture, hydrating cement and sand and assuring adhesion of fine and evenly distributed coating of cement to each particle. Mixture of sand, cement and water applied to surface at high velocity. At first, portion of sand rebounds and cement coating is deposited. As less sand rebounds, mortar coating of desired thickness is built up. Water used claimed not to exceed 2½ gal. to standard sack of cement. Mortar coating said to have high bonding qualities, to weld cracked concrete and to make satisfactory bond with glass. Supplied with 25 ft. of 1¼-in. hose, 50 ft. of air hose and equal length of ¾-in. water hose. Extra gun is supplied for emergency use.—Hiram Elliott Construction Co., 1016 Baltimore Ave., Kansas City, Mo.

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CLAIM



BUCKEYE R-B Power Finegraders have brought into the paving picture one of the few major advances in methods that have been introduced since the first pavers were built. These one man operated machines, riding on the forms, slice the grade to exact cross section eliminating nearly all hand labor, reducing the loss of yield to a negligible percentage, ending penalties for thin slabs and ending the problem of keeping the grade well ahead of the paver. There are no delays with an R-B Finegrader — they move fast even in rocky soil. Many are working ahead of two 34-E pavers. They'll leave any desired amount of fines for compacting by the roller. Depth of cut is adjustable by hydraulic lifts. Two models provide cutting widths from 10' to 25'. If you have a road or airport paving contract, R-B Finegraders will speed up the job and lower your costs plenty. One good job and the machine pays for itself. Full details in new Bulletin. Send for it and ask for name of nearest dealer.

BUCKEYE TRACTION DITCHER CO.
FINDLAY, OHIO

*No other existing
equipment can
prepare subgrade
as quickly,
cheaply and
accurately as*

**a
BUCKEYE
R-B POWER
FINEGRADER**

Built by Buckeye ✓

Convertible Shovels



Trenchers



Tractor Equipment



R-B Finegraders



Road Wideners

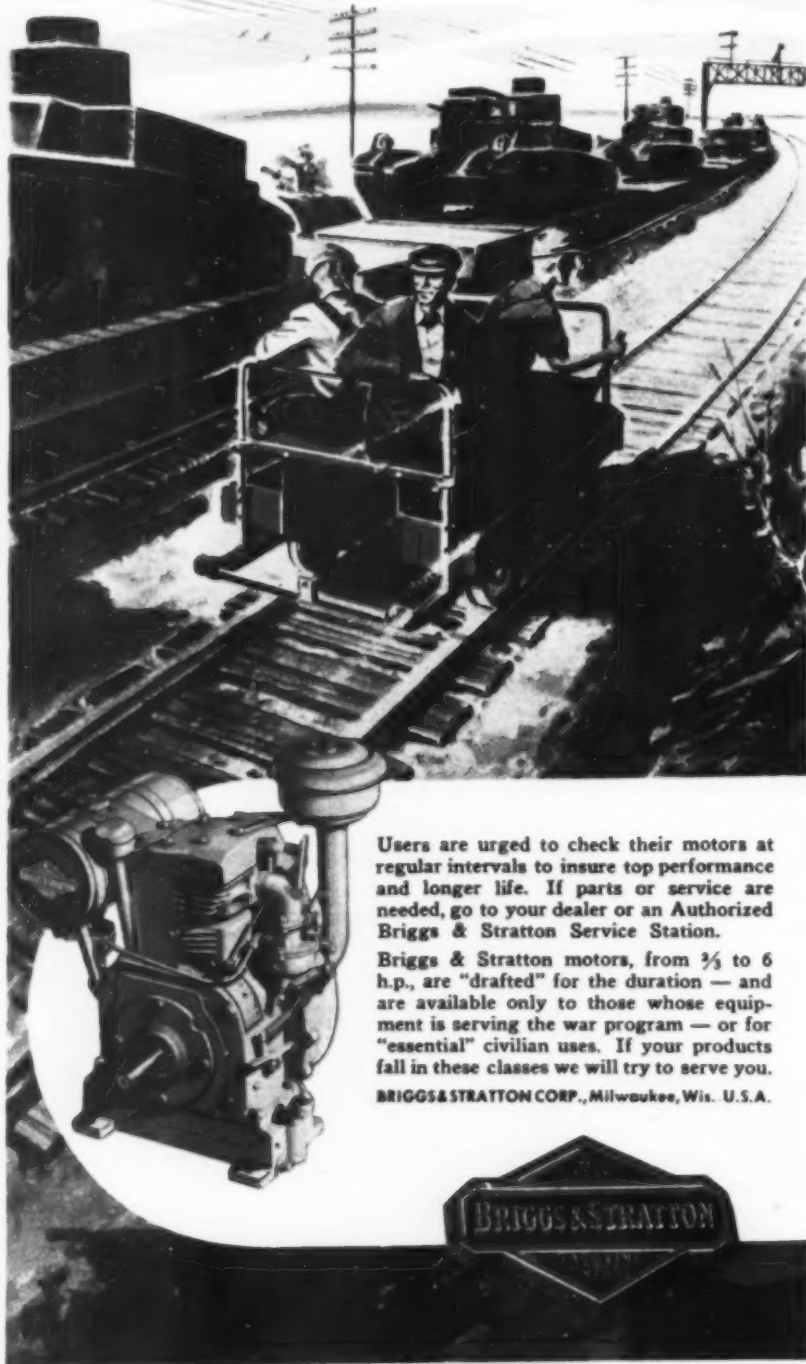


Spreaders



SMALL MOTORS ON PATROL — *Guarding America's Railways*

Shipments of war material must have the "green light." Roadbeds need inspection and maintenance — bridges, railheads, and war shipments must be protected against saboteurs, wear and tear. So old-fashioned handcars and maintenance equipment give way to modern railroad machinery, much of which is powered by Briggs & Stratton 4-cycle, air-cooled gasoline motors. These sturdy, easy-starting motors can always be depended on to do their part in protecting and maintaining vital rail lines!



Users are urged to check their motors at regular intervals to insure top performance and longer life. If parts or service are needed, go to your dealer or an Authorized Briggs & Stratton Service Station.

Briggs & Stratton motors, from $\frac{3}{8}$ to 6 h.p., are "drafted" for the duration — and are available only to those whose equipment is serving the war program — or for "essential" civilian uses. If your products fall in these classes we will try to serve you.

BRIGGS & STRATTON CORP., Milwaukee, Wis., U.S.A.



SLOTTED WOOD MOLDING for curtain traverses comes with slide curtain hanging feature which eliminates need for metal curtain rods and fixtures at windows, in open doorways and between living rooms and dining alcoves. For curtain traverses there is double slot design for use instead of regular window head trim or over plaster reveals.



and one for attachment to top of regular head trim; single slot style for similar use; flat molding with double or triple slots for boxed wooden valances. Curtain hanging device for operation in slotted moldings is cotton tape set at intervals with sliders. When tape is sewed to curtains, slider is inserted into slot through aperture at end of molding. One pair of curtains or draperies may be hung with single slot moldings. With double slot moldings, either glass or blackout curtains may be hung under draperies. Moldings are made of kiln-dried and processed medium hard woods and come in 4-, 6- and 8-ft. and other standard lengths. —Jiffy Join, Inc. 203 W. 18th St., New York City.

★ ★ ★

AMMONIA DRY-DEVELOPED PRINTING PAPER, known as Vapo-Paper, develops deeper, sharper blue or red line print on clean white background. Every roll is claimed to be uniform as to speed and color so that printing and developing machines do not have to be set to conform with variances in different rolls. Paper's 50 percent rag content basic paper stock enables it to stand up under creasing and hard usage. —The Frederick Post Co., Box 803, Chicago, Ill.

★ ★ ★

CAST IRON FLOOR GRID for all types of concrete flooring subject to heavy wear has been developed to assure non-cupping when filled with cement and is claimed to prevent cracking, breaking and disintegrating of floors subject to heavy loads and to eliminate pot-holes, ruts and ridges. Standard unit



sizes of 1 ft. 6 in. x 3 ft. x $\frac{3}{4}$ in. is said to permit economy and ease of installation. Side and end interlocking fastening device eliminates bolting and other labor factors. Lug provides gage for uniform top coating and results in flush working surface when completed. When assembled and filled with concrete, it forms continuous reinforced mat on which heavy-duty trucks may be moved with minimum effort. —Seelauton Co., Inc., 2500 W. 27th St., Cleveland, Ohio.

Don't delay war jobs!



Keep your construction equipment in first-class shape — have your Blaw-Knox dealer inspect it today!

Breakdowns are costly to the war effort. Depend on your **BLAW-KNOX** dealer to help you avoid them — to keep your construction equipment at peak operating efficiency.

COAST TO COAST SERVICE

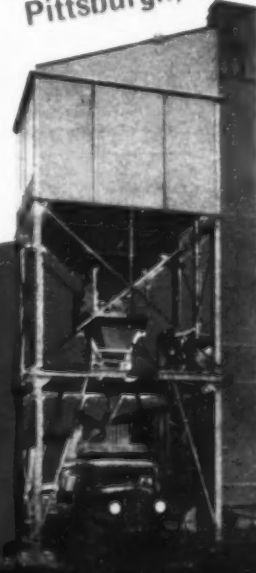
ALABAMA Birmingham Phoenix	Young & Vane Supply Company	MAINE Portland	Stanley & Cadogan Company	OHIO Cleveland Columbus Cincinnati Tulsa	H. B. Fuller Equipment Company W. H. Williams Company W. W. Williams Company
ARIZONA Phoenix	State Tractor Equipment Company	MARYLAND Baltimore	Henry H. Meyer Company, Inc.	OKLAHOMA Oklahoma City Tulsa	Leland Equipment Company Leland Equipment Company
ARKANSAS Little Rock	Lynn Machinery Company	MASSACHUSETTS Boston	The Equipment Company	OREGON Portland	Contractor Equipment Corporation
CALIFORNIA Los Angeles San Francisco	LeBoeuf Machinery Company E. M. Orndt C. H. Grant Company	MICHIGAN Detroit Grand Rapids Iron Mountain	Wm. P. Favorite Company Contractors Machinery Company Service & Supply Division	PENNSYLVANIA Harrisburg Philadelphia Pittsburgh	Dravo Doyle Company Giles & Ransome Dravo Doyle Company
COLORADO Denver	Ray Corson Machinery Company	MINNESOTA Duluth St. Paul	Bochert Ingersoll, Inc. Bochert Ingersoll, Inc.	SOUTH CAROLINA Columbia	Jell Hunt Road Machinery Company
CONNECTICUT New Haven	The W. I. Clark Company	MISSISSIPPI Amory	Dalrymple Equipment Company	TENNESSEE Chattanooga Knoxville Nashville	Nixon Hassell Company Wilson Weesner Wilkinson Co. Wilson Weesner Wilkinson Co.
DISTRICT OF COLUMBIA Washington	Mat A. Doelch Machinery Company	MISSOURI Kansas City St. Louis	G. W. Van Keppel Company O. B. Avery Company	TEXAS Dallas Houston San Antonio	Conley Lott Nichols Machinery Company R. B. Everett & Company Cochran Equipment Company
FLORIDA Jacksonville Maitland Miami Tampa	Quinn R. Barton, Inc. Berry & Brown, Inc. East Coast Equipment Company, Inc. Epperson & Company	MONTANA Billings Great Falls Helena	Western Construction Equipment Co.	UTAH Salt Lake City	Lund Machinery Company
GEORGIA Atlanta	W. C. Cary & Company	NEBRASKA Omaha	Anderson Equipment Company	VERMONT Barre	Cassini Venable Corporation
IDaho Boise	Intermountain Equipment Company	NEW MEXICO Albuquerque Bilings	Power Equipment Company	VIRGINIA Roanoke Richmond	Roanoke Tractor & Equipment Corp. Roanoke Tractor & Equipment Corp.
ILLINOIS Chicago	O. T. Christerson Company	NEW YORK Albany Buffalo Elmira Rochester Syracuse Utica	Larkin Equipment Company Trevor Corporation Leavelle, McLeod & Kinkade Newing Motor Co. R. E. Brooks Company Keystone Builders Supply Co., Inc. Syracuse Plaster Company McQuade & Bannigan	WASHINGTON Seattle Spokane	A. H. Cox & Co. L. A. Snow Company Empire Equipment Company
INDIANA Indianapolis	Reid Holcomb Company	NORTH CAROLINA Raleigh Salisbury	Carolina Tractor & Equipment Co. Carolina Tractor & Equipment Co.	WEST VIRGINIA Charleston Clarksburg	Charleston Tractor & Equipment Corp. Charleston Tractor & Equipment Corp.
IOWA Des Moines	Gierke Robinson Company Berman M. Brown Company	NORTH DAKOTA Fargo	Dakota Tractor & Equipment Company	WISCONSIN Milwaukee	Hunter Tractor & Machinery Co.
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BLAW-KNOX

BLAW-KNOX DIVISION
of **BLAW-KNOX COMPANY**
Pittsburgh, Pa.

Farmer's Bank Bldg.

CONCRETE FINISHING MACHINES • CONCRETE SPREADERS • ROAD FORMS • BINS & BATCHERS
BULK CEMENT PLANTS • TRUCK MIXERS • CENTRAL MIXING PLANTS • CLAMSHELL BUCKETS
CONCRETE BUCKETS • STEEL STREET FORMS • TAMPING ROLLERS



FOR BIGGER PAY-LOAD DIGGING

HAISS HI-POWER

**UP TO 7 PARTS
OF CLOSING LINE**

Exclusive four-position, wedge-block dead-ending that keeps line always centered over grooves in the sheaves... Highest closing power!



Buckets in stock at New York, Philadelphia, Baltimore, Atlanta, Richmond, Charlotte and Los Angeles... Write or wire for prices, delivery and catalog details.

GEORGE HAISS MFG. CO., INC., 139TH ST. & CANAL PL., NEW YORK



EXTRUDED PLASTIC THRESHOLD known as "Tenite-Two", cellulose acetate product, is being offered as weatherstripping sill for outside doors instead of metal units. Arrangement of threshold and door hook, as illustrated, is said to aid in fuel conservation. Two designs available, both in brown plastic to harmonize with typical floor finishes. Material said to be practically indestructible. Screw and interlocking hook included. Available in lengths for standard door widths.—**Tennessee-Eastman Co., Kingsport, Tenn.**



★ ★ ★

NEW SANDBLAST HOSE designated "B.F.G." is made of synthetic rubber compounds without internal wire construction and is said to carry away static electricity as fast as it forms. For high voltages of static electricity, the company engineers claim that compound is practically as good a conductor as metal. Following laboratory tests on new hose, several thousand feet were placed on test to carry high velocity sand on large construction job where ordinary highest quality rubber sandblast hose was not able to carry away electricity and hose could not be handled by operator. New synthetic compound hose performed its task well under these difficult conditions, not only carrying away high static charges, but proving itself resistant to abrasion by sharp sand particles. New hose is 4-ply construction with 1/4-in. tube, in sizes ranging from 3/4 in. to 3 in.—**The B. F. Goodrich Co., Akron, Ohio.**

★ ★ ★

FROM FOOTING TO SILLS IN

24 hrs.
with
Sonotube



Especially constructed laminated fibre wax treated



MADE TO SIZE TUBING FOR CONCRETE PIER FORMS

9	10	11 1/4	12	13 1/4	Inside Diam.
64	78.54	100	113.1	144	Square Inches

Lengths up to 24 feet. Saw to size on job.

IMMEDIATE DELIVERY

Approved for Cantonments and Other Government Construction

Write for delivered prices and illustrated folder

SONOCO PRODUCTS COMPANY

HARTSVILLE, S. C. MYSTIC, CONN.
ROCKINGHAM, N. C. GARWOOD, N. J. LOWELL, MASS.

Save Time and Money

U. S. Army Engineers
U. S. Navy Dept. Yards & Docks
P. B. A. and F. H. A.



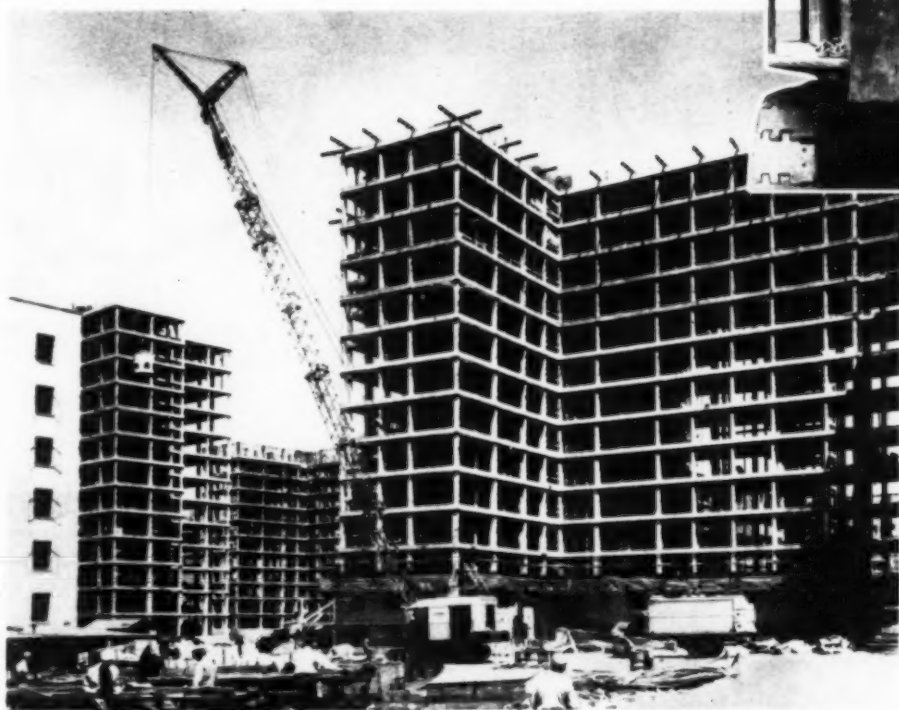
ACOUSTIC FENCE, designed by E. I. du Pont de Nemours & Co. to guard nation's war plants, passes off greatly amplified sounds to guards on alert at central control panel for alarm signal and flash of red light which tells just where along miles of fence intruder is attempting illegal entry. Especially developed magnetic pick-up of weatherproof construction is attached to fence at intervals of 1,000 ft.



This results in operating range of 500 ft. on each side of pick-up which is about one third maximum possible range. Where guard towers are placed along fence at intervals of 800 to 3,000 ft. it is necessary only to have pick-ups between guard towers. If wires are cut, system, instead of going dead, sounds an alarm which cannot be shut off until break is repaired. In spite of poor visibility around war plants, acoustic fence reduces saboteurs' chance of entry to zero. Claimed to stand as good a watch in fog, blackout, darkness or storm as could be maintained by guards standing elbow to elbow.—**Licensee, Automatic Alarms Co., Youngstown, Ohio.**

GULF LUBRICANTS *and* FUELS

*help speed up
huge housing project*



Three large New York contractors — Corbetta Construction Company, Willcox Construction Company, and Knickerbocker Concrete Arch Construction Company — are working together as The Three Companies on the Fort Greene Housing Project, Brooklyn, New York. This huge project comprises 35 buildings with reinforced concrete superstructure. The concrete is being poured entirely by crane, the largest job of its kind in the country to be handled in this way. The pouring crane has a 140-foot boom. Gulf lubricants and fuels are helping this contractor stay well ahead of schedule.

“Gulf products are largely responsible for the fine performance of all our equipment on this job . . . one of the reasons we are well ahead of schedule”

says Contractor

“OUR equipment has performed without a hitch on this job with Gulf lubricants and fuels in service — no breakdowns, and no delays caused by mechanical troubles,” says contractor on huge housing project. “That’s one big reason why we’re well ahead of schedule — and why we expect to

maintain our fast pace until the job is finished.”

You, too, will find it pays to call in the Gulf engineer to prescribe the right Gulf lubricants and motor fuels for your equipment. If the most suitable type of lubricants are selected for every lubricating requirement of your various units you can get maximum trouble-free job performance at minimum expense for maintenance and repairs.

No matter where your job is located, you are sure of quick delivery of Gulf quality lubricants and fuels

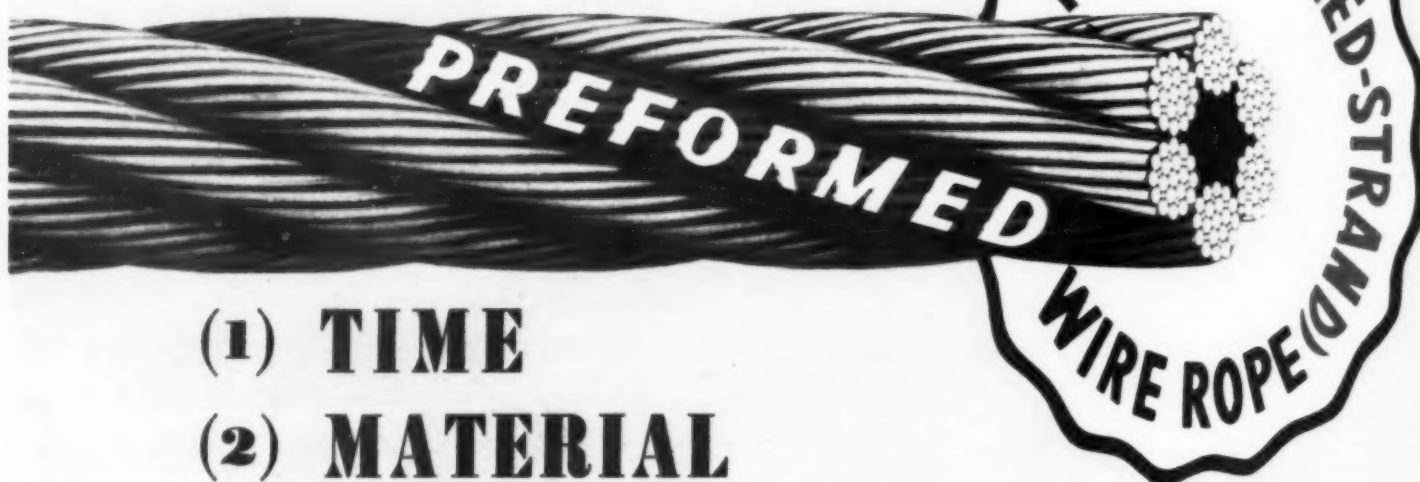


through more than 1200 warehouses located in 30 states from Maine to New Mexico. Write or 'phone your nearest Gulf office today.

GULF OIL CORPORATION • GULF REFINING COMPANY • PITTSBURGH, PA.

OIL IS AMMUNITION . . . USE IT WISELY!

A Timely 2-Way Saving With



- (1) TIME
- (2) MATERIAL

How can production be speeded? How can essential materials be best conserved? These, today, are vital questions.

With wire rope, the answer is in using the quality, construction and type that can be installed the quickest . . . that will last the longest, and thus do the most work for the amount of materials employed.

You can depend on Preformed "HERCULES" (Red-Strand) Wire Rope for this 2-Way Saving. It not only lasts longer — which means fewer replacements — but because it is easier

to handle, it can be installed more quickly. It provides all the advantages of the preforming process, *plus* the inherent qualities and advanced manufacturing methods that have long since caused the "Red Strand" to be recognized as the sterling mark for wire rope.

Why not take advantage of this 2-way saving? In doing so you will also be reducing your operating costs, for the principles that make "HERCULES" long lasting, also make for maximum economy.

Preformed "HERCULES" (Red-Strand) Wire Rope is furnished in both Round Strand and Flattened Strand constructions. In this one grade there is a right rope for every heavy duty service.

MADE ONLY BY			
A. LESCHEN & SONS ROPE CO.			
WIRE ROPE MAKERS			
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NEW YORK / / / 90 West Street CHICAGO / / 810 W. Washington Blvd. DENVER / / 1554 Wazee Street		ESTABLISHED 1857 ST. LOUIS, MISSOURI, U. S. A. SAN FRANCISCO / / 520 Fourth Street PORTLAND / / 914 N. W. 14th Avenue SEATTLE / / 3410 First Avenue South	

WELDING ELECTRODE. a.c.-type, is now available for work in vertical and overhead positions, fulfilling long-felt need for electrode that would give high quality job from standpoint of physical characteristics as well as easy operation, adequate penetration and practically flat fillet contour. Use of this electrode will enable welding shops and fabricators to release d.c. machines for fabrication work where their services are essential. Said to compare favor-



ably with highest quality vertical and overhead welding characteristics available from reverse polarity d.c. electrodes and to provide strong, forceful arc having good fusion, excellent penetration and uniform characteristics free from arc blow. Available in $\frac{1}{8}$ - and $\frac{5}{32}$ -in. diameters. Other sizes from $\frac{1}{16}$ - to $\frac{1}{4}$ -in. are expected to be available shortly. Welds made with this electrode said to show following physical properties: Ultimate tensile strength, 72,000 lb. per sq.in.; yield point, 60,000 lb. per sq.in.; elongation in 2 in., 26 percent; reduction of area, 46 percent.—General Electric Co., Schenectady, N. Y.

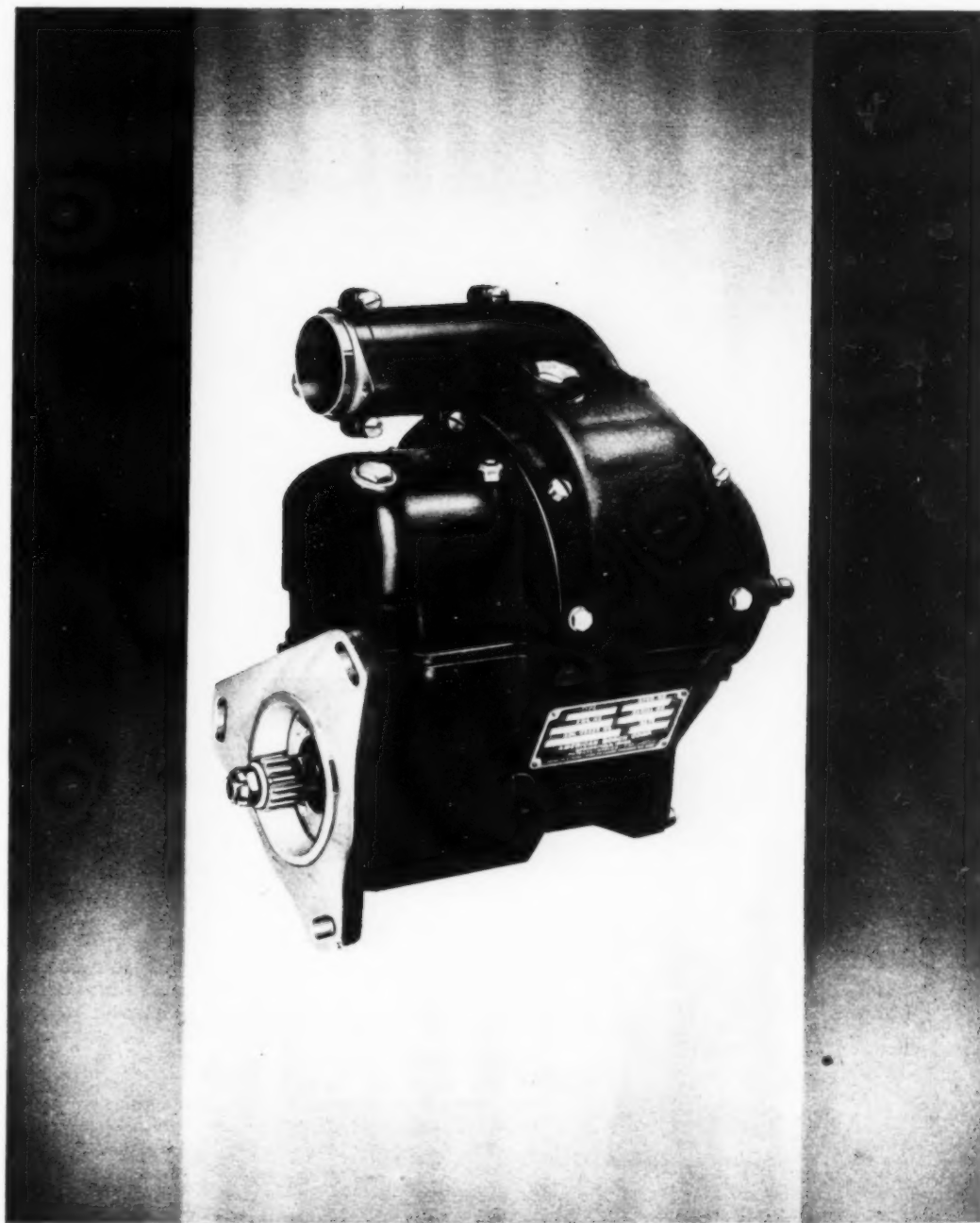
★ ★ ★

PLASTIC-COATED WALL PANELS are offered to emergency housing builders and to contractors on other construction and modernization projects because they are said to be completely pre-finished and require no "on-the-job" treatment after installation. Supplied in sheets as large as 4x8 ft. Sheets



are best applied, according to makers, by waterproof adhesive, but may also be installed with brads. Available in 10 attractive colors permanently bonded to sheets by heat treatment. Surface claimed to be waterproof, stain-proof, dirt-proof and vermin-proof and may be cleaned with soap and water. Three types may be had: tileboard, panelboard and streamlined board (shown left to right in photo). May be installed by any competent carpenter.—Barclay Manufacturing Co., 385 Gerard Ave., New York City.

TOP FLIGHT



In times of peace, among users of engines requiring magneto ignition, the quality of American Bosch has always been regarded as top flight. Today this reputation serves the nation well. American Bosch Aviation Magnetos are standard on many of America's mightiest warplanes.

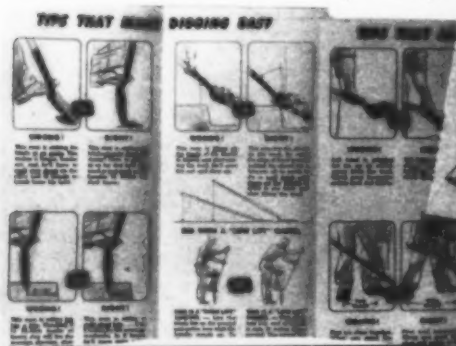
AMERICAN BOSCH CORPORATION, Springfield, Mass.
Branches: New York, Cleveland, Detroit, Chicago, San Francisco

(Also makers of American Bosch Coils, Generators, Windshield Wipers and Diesel Injection Equipment)

AMERICAN BOSCH MAGNETO

Show your men HOW to GET MORE WORK OUT OF A SHOVEL

FREE to any user of shovels



14 USEFUL TIPS showing ways to speed up material handling — save time, save money, save man power!

Order as many copies as needed; post where men can see them!

A service to industry offered by the makers of
RAZOR-BACK
Only Shovel with a Backbone
(60" thicker center from tip to top)

THE UNION FORK & HOE COMPANY
551 Dublin Ave. Columbus, Ohio

Without obligation, send _____ copies of "How to Get More Work Out of a Shovel" with pictures suitable for posting on the job.

Name _____

Address _____

LE ROI
POWERED
for more
HP hrs per \$

... Le Roi Engines are standard equipment on many types and makes of construction machinery

The heart of any machine is the power unit that drives it. That is why it pays you to look for Le Roi engines on equipment you buy. • Through years of experience in heavy duty service — practical design and quality manufacture — extra features that reduce maintenance and operating costs and safeguard the life of the engine — Le Roi gives you extra dependability and saves you money. Get Le Roi's on your next equipment, for performance you can be proud of.

Le Roi Company, Milwaukee, Wisconsin.

E-11

Kwik-Mix Bituminous Mixer equipped with Le Roi Power Unit.



DYNAMITE CARTRIDGE, called "Tamptite" is so constructed that tamping causes charge to expand to walls of drill hole, obviating necessity of slitting cartridges and permitting concentration of charge within hole with little or no spillage of powder. Is said to enjoy wide acceptance in metal mining, quarrying and construction industries where maximum cut and good rock breakage are primary requirements. Dynamite in new cartridge is packed



in waxed paper shell having line of perforations spiraled around dynamite stick. Contains same weight of paper as standard shell. Line of perforations is located between inner and outer layers of paper so that there is no direct track through which moisture might enter or ingredients leak out. Shell is not weakened to point where priming is difficult, and cartridges stand up in shipping and handling on job as well as regular cartridges. When tamped in bore hole, cartridge does not open as slit cartridge does, but unwraps slightly as cartridge expands to fill hole. Splitting along perforated line permits dynamite to be telescoped to shortened length while it expands to diameter of hole. Even in upper holes where dynamite in slit cartridges often spills, little or no spillage occurs with new cartridge. Cartridge will make obsolete practice of slitting cartridges before loading, common method of concentrating charge to obtain better breakage and pull more material. Operations should be speeded by new shell. All grades commonly used underground or in rock work and in cartridge diameters up to 1 3/4 in. are now available packed in Tamptite shell.—Hercules Powder Co., Wilmington, Del.

★ ★ ★

MANGANESE STEEL WELDING ROD, known as V-Mang, is made of alloy steel containing 12 to 14 percent manganese, molybdenum and other elements and will replace nickel-manganese steel electrodes formerly manufactured by this company, thus conserving nickel without hampering reclamation of manganese steel and other ferrous equipment parts. New rod may be applied as readily as rods in former use and has ductility and tensile strength equal or better than these, according to makers. Can be used to repair fractures in manganese steel parts, as well as for build-up work, depositing uniform bead similar to that made by nickel-manganese electrodes. Available bare and coated in 1/8-, 5/32-, 3/16- and 1/4-in. diameters and in 18-in. lengths. Standard containers, waterproof-paper lined wooden boxes, hold 50 lb. of rod.—American Manganese Steel Division, The American Brake Shoe & Foundry Co., Chicago Heights, Ill.

TECO Timber Construction *Cuts Cost* OF MORENCI LAUNDERS TRESTLES



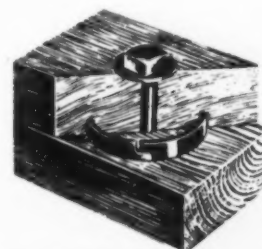
**Savings in time, timber and hardware... advantages in design...
win mining engineers to TECO System**

As one Phelps Dodge engineer, explaining why the TECO System was used in part of the construction of the Morenci Reduction Works, said:

"In our opinion, timber connectors were more economical than plain, bolted connections because we were able to develop the necessary strength at the intersections of bracing members and posts without the use of scabs and without perforating the members

excessively. The braces are simply tapped across the posts. There were considerable savings in bolts and washers but the chief advantage seemed to be in the savings due to the reduction of labor and of the sizes of some of the main members."

For complete data on TECO and typical designs for large and small structures... write us today.



The TECO Ring Connector spreads the load on a timber joint over practically the entire cross-section of the wood.

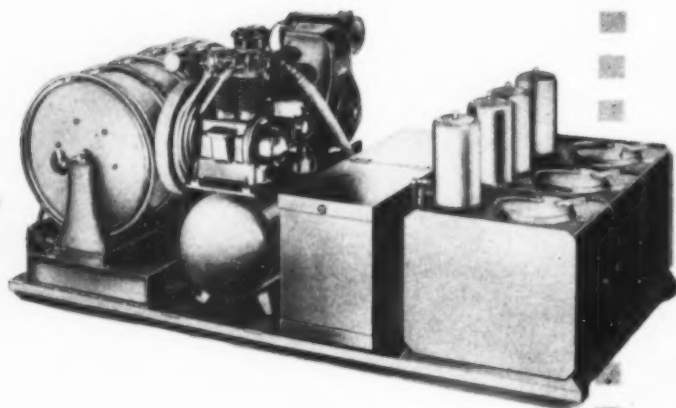
Timber ENGINEERING COMPANY

WASHINGTON D. C. ★ PORTLAND, OREGON



The Graco CONVOY LUBER

... Lubricates Trucks, Tractors and all kinds of construction equipment **ON THE JOB**



★ You can save time, reduce costs, minimize breakdowns and delays by using the Graco Convoy Luber for modern, high pressure, *on-the-job* lubrication. Various models offer power facilities for all types of lubrication service. Completely assembled at the factory and mounted on a rigid steel frame, Graco Convoy Lubers can be loaded on a truck or trailer and put into active operation in a few minutes. Write or wire for details.

FEATURES

Air Powered Lubricant Pumps

Each different lubricant employed is dispensed at proper pressure and in proper volume by a powerful pneumatic pump of scientific design and high quality construction. Pumps are powered by air from built-in, engine-driven air compressor.

Convenient Hose Reels

Each of four or more hose reels, conveniently mounted at the rear of the unit, carry 30 feet of lubricant hose. Each lubricant hose terminates in a control valve and suitable nozzles and adapters. Another reel offers 50 feet of air hose for tire inflation.

Complete Accessory Kit

Each Graco Convoy Luber includes a complete kit of five hand guns, oilers, and other lubrication accessories as well as extra adapters and spare parts for emergency use.

Dispense from Original Containers

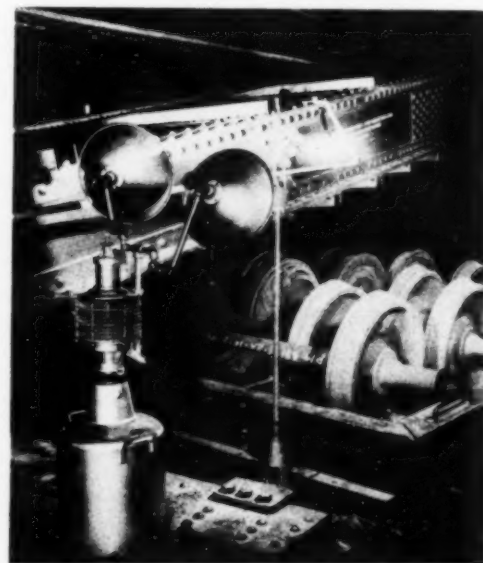
Convoy Lubers are offered to dispense from original 100-lb. or 400-lb. containers or from leaded steel lubricant tanks. Tanks have built in exhaust heater for use in cold weather.



GRACO

GRAY COMPANY, INC. MANUFACTURERS OF HIGH QUALITY LUBRICATING EQUIPMENT • Minneapolis, Minn.

PORTABLE FLOODLIGHTS for construction and repair work, for routine checking jobs or for any emergency use, enables workmen to carry on in night shifts without usual delay and expense of



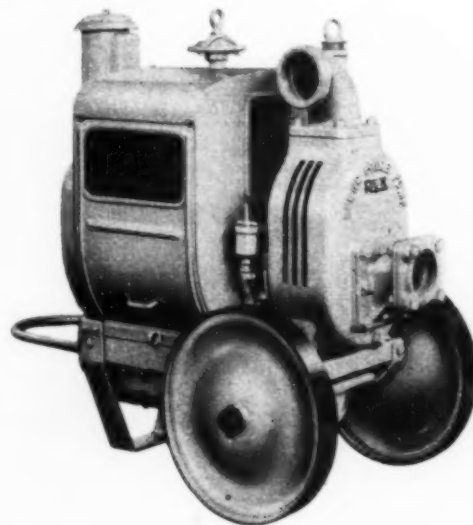
installing permanent lighting set-ups. Model illustrated, largest now in production, has two 8,000 candlepower floodlights constructed on swing joints, thereby allowing independent directional control with 16,000 candlepower concentration of light. Portable floodlight may be used continuously or intermittently and is ready for instant use while carbide charge lasts.—National Carbide Corp., 60 E. 42nd St., New York City.

★ ★ ★

TRANSPARENT PROTECTIVE COATING FOR WINDOWS has been developed to prevent injury caused by flying pieces of glass broken by vibration, said to be responsible for largest number of casualties during bombing raids. Window glass or plate glass treated with this new coating, known as "Glasshield", is said to be turned into safety glass. Coated pane may break but does not shatter, according to manufacturer. Coating claimed not to interfere with vision or light transmission through glass. Two coats of Glasshield on inside surface of window pane are said to be effective, but for maximum protection, outside surface should be similarly treated. Coating is applied with brush, allowing 1 hr. for first coat to dry before adding second one. When no longer necessary, coatings may be removed with razor blade.—Maas & Waldstein Co., Newark, N. J.

★ ★ ★

NEW 4-IN. PUMP with capacity of 30,000 gph., is powered by 10-12-hp. air-cooled engine, is self-priming and has patented Rex Z-Metal air peeler which peels air from impeller when pump is priming or when it is actually pumping. Pump also has Rex Z-metal impeller and alloy steel volute liners to defeat wear.—Chain Belt Co., 1600 W. Bruce St., Milwaukee, Wis.





LIMA CRANES meet demands for Extraordinary Service



Cranes - LIMA Type 750

Boom - 120' — machine has been in operation on similar work since December, 1941 never using less than 100' boom. Original boom hoist cable is still in use. (June 20, 1942)

Jib - 20'

Bucket - 46 Cubic Feet

Weight of Bucket and Material -

8400 lbs. or over 4 Tons

Hoist - Single Line

Job - Ft. Greene Housing Project

Location - Brooklyn, N. Y.

Contractors - Three Companies, Inc.

CORBETTA CONSTRUCTION CO., INC.
WILLCOX CONSTRUCTION CO., INC.
KNICKERBOCKER CONCRETE ARCH
CONSTRUCTION CO., INC.



On the
\$21,000,000 Fort Greene
Housing Project in Brooklyn,
New York, LIMA cranes are showing
the way to hoist concrete on a
single line to a height of 14 floors and do it
quickly, safely and economically.

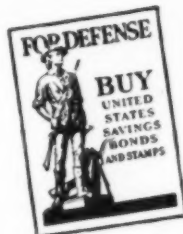
General Superintendent P. L. Moccia has this to say about the LIMA cranes:

"The heavy truck-frame casting, massive crawlers and resulting low center of gravity on these LIMA cranes enables them to handle a long boom without tendency toward tipping. The positive lever control makes it possible for the operator to have the feel of his load at all times and to work surely and quickly. This saves us time on the job."

Mr. C. H. Davidson, Project Manager, also points out that their exceptional progress was further due to planning the job so as to permit continual pouring by cranes on one or another of the 38 units which he admits, required streamlined coordination.

LIMA LOCOMOTIVE WORKS, INCORPORATED
Shovel and Crane Division LIMA, OHIO

NEWARK, N. J. NEW YORK, N. Y. DALLAS, TEX. MEMPHIS, TENN. SEATTLE, WASH. PORTLAND, ORE. SAN FRANCISCO, CAL.
LOS ANGELES, CALIF. SPOKANE, WASH. PHILADELPHIA, PA. VANCOUVER, B. C. MONTREAL, QUEBEC, CAN.



LIMA

SHOVELS
♦ CRANES ♦
DRAGLINES

A TYPE AND SIZE FOR EVERY JOB



Instead of a finger-pinching U-Bolt, put a real Fist-Grip Safety Clip on your wire rope. Four drop-forged flat bearing surfaces *hold* the rope without crushing or bowing, with far more strength than the rope-biting, rope-weakening U-Bolt.

And inexperienced help can't put it on wrong — its halves are identical. The dangers and slippage of the backward-applied U-Bolt are *impossible*.



For Full War Effort — 25% More Steel

Safety Clips, in an assembly as strong as a U-Bolt job, use 25% less steel. When you buy Safety Clips, that steel goes into guns and ships and planes. You need fewer clips, too — and there are no U-Bolt crushed rope ends to be cut off and thrown to waste. This adds up to considerable help to Uncle Sam.

Are You Getting These Safety Savings?

No rope bowing or crimping	rope saved
No battered, bent threads	clips saved
No special wrench	tools saved
Bolts on opposite sides	tightening time saved
Can't go on wrong	accidents saved
Fewer clips needed	clips saved
Fewer rope breaks	accidents saved

*Distributed Exclusively Through
Mill Supply Houses*

Look for Laughlin Products in Thomas' Register



Pitfalls in Bidding

Address at meeting of American Road Builders' Association by Walter C. Sadler, Professor of Civil Engineering, University of Michigan, and Mayor, Ann Arbor, Mich.

Continued from page 112, April Issue of
CONSTRUCTION METHODS

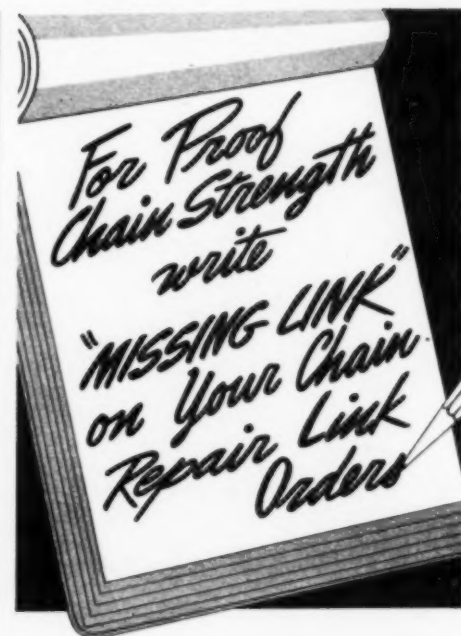
Carriers and Public Risks

It might be recalled that the liability of a public carrier of passengers, such as the New York Central Railroad, is practically that of an insurer and the carrier in question virtually guarantees to transport the public without injury. That is the practical significance of these cases. Now we might consider for a moment that situation where a general contractor receives the contract to grade and surface a substantial length of highway which incidentally crosses a small river at one place. The contract may require that the contractor furnish detour facilities throughout the length of construction and incidentally that he construct and furnish ferry service across the stream. If there are provisions for toll charges on this ferry service, the contractor is in particular difficulty on the basis of a common carrier.

On the other hand if the contractor merely furnishes free ferry service or free bridge service during the period when the old bridge is being replaced by the new one, the liability is probably similar to that on the rest of the detour along the highway right-of-way. It becomes merely a question of negligence. It is undoubtedly appreciated that the risk incident to dealing with the general traveling public is quite high, even to the extent that the average local jury will be distinctly sympathetic with an injured neighbor who had an accident on the detour as a result of an outside contractor's negligence. In other words, contracts requiring the construction of temporary roads adjacent to the right-of-way of the new construction should be most carefully planned to the extent that the estimator will make appropriate allowances for those conditions which the contractor elects to assume with the full realization that the poorer the quality of the detour, the greater the incident risk which is involved. These facts are particularly pertinent in view of the modern contracts which place the full extent of the liability of such agreements upon the contractor.

Waters

While there has been very little litigation during recent years in the matter of
(Continued on Page 88)



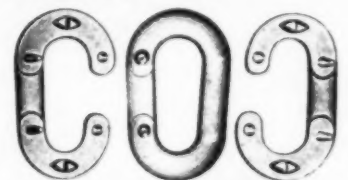
You get "Pressed Fit" only with genuine Laughlin "Missing Links"

The drop-forged, heat-treated "Missing Link" is press-fitted together under pressure, matching the parts so there is no play, no shearing action on the rivet. Under stress the rivet merely holds the "Missing Link" together, and does not take the load.



THE "MISSING LINK"

Drop-forged steel, heat-treated.
Sizes from $\frac{3}{16}$ " — $1\frac{7}{8}$ "



THE PEAR SHAPE "MISSING LINK"

The link with larger inside dimensions.
Each link drop-forged and heat-treated.

Save time, increase safety by specifying
The Genuine "Missing Link"

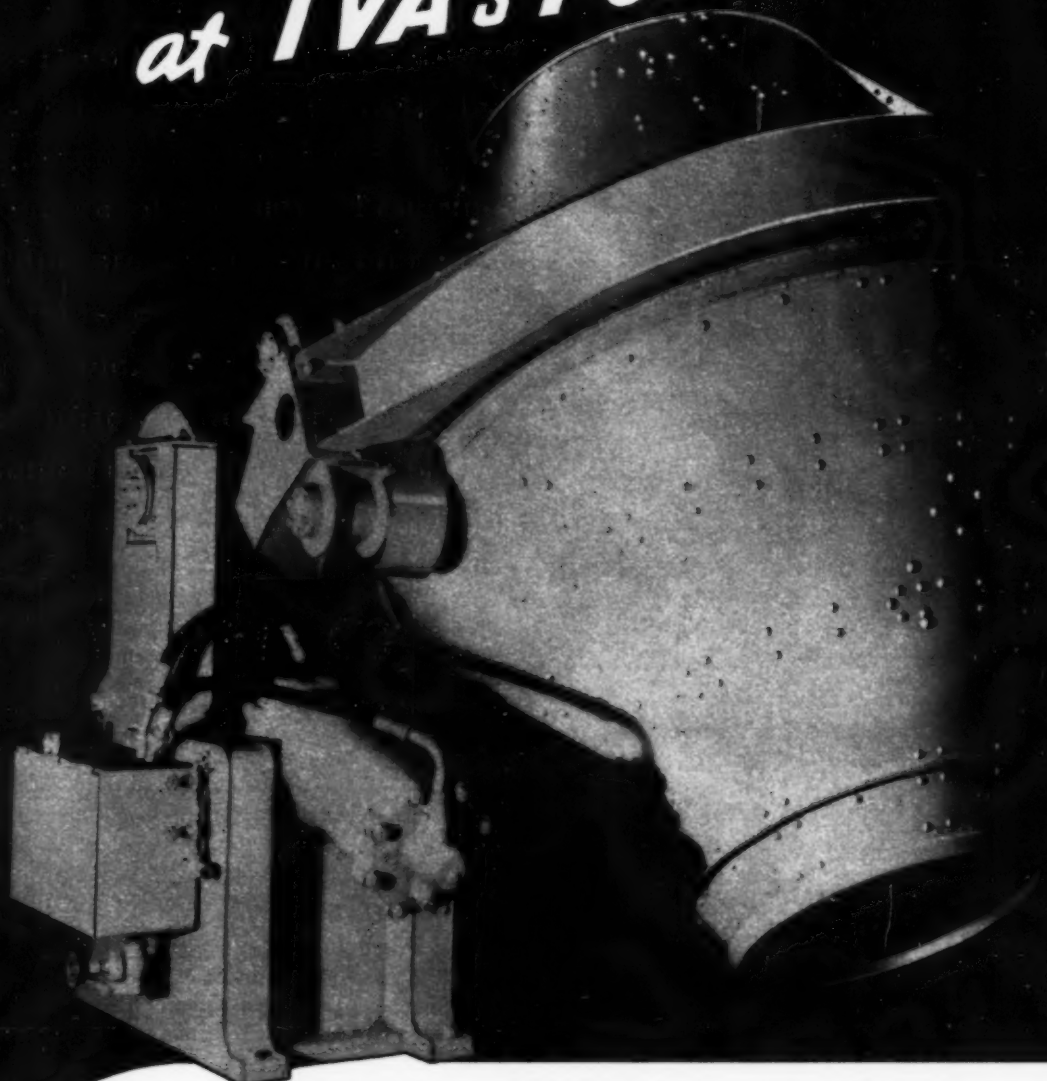
Write for latest catalog on Laughlin Industrial Hardware.

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Mill Supply Houses*

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*Drafted for U.S. Service
at TVA's FONTANA DAM!*



Famous Smith Tilting Mixer—the last word in concrete mixer design and construction.

FIVE SMITH 4-YARD TILTERS

are slated to pour the 2,650,000 yards of concrete required for TVA's new Fontana Dam at Little Tennessee River, North Carolina. Smith Tilters were selected for this important war project because of their proven ability to produce uniform concrete on a fast, efficient, production basis. For more than 40 years, Smiths have set the pace for concrete mixers on big engineering projects: Boulder Dam, Tygart Valley Reservoir, Watts Bar Dam, Cherokee Dam, and many others.

New, improved Smith Tilter features include: All-welded box girder pedestals and tilting frame; heat treated, high-carbon steel roller track, drum gear and pinion with machine cut teeth; forged, heat-treated edge rollers and main rollers; 60° drum tilt with automatic pneumatic tilting unit; fully enclosed machine cut spur gear transmission unit with splined alloy steel shafts; direct connected, 75 hp. electric motor drive. All sizes available.

Write for full particulars.

The T. L. SMITH CO., 2851 N. 32nd St., Milwaukee, Wis., U. S. A.



SMITH MIXERS

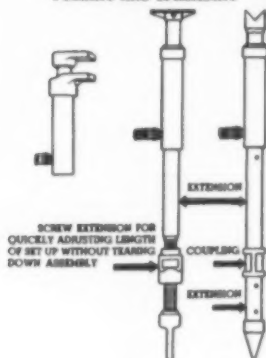
USED ON THE WORLD'S GREATEST CONCRETE PROJECTS



PORTO-POWER is a Hydraulic Jack which has its ram separated from the pump by a high-pressure hose. The ram thus works in all directions, and the plunger action is "harnessed" by simple attachments for pushing, pulling, spreading, pressing and bending over any span and angle.

TYPICAL PORTO-POWER SET-UPS

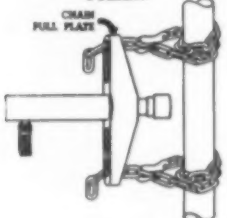
PUSHING AND SPREADING



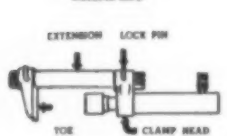
LIFTING



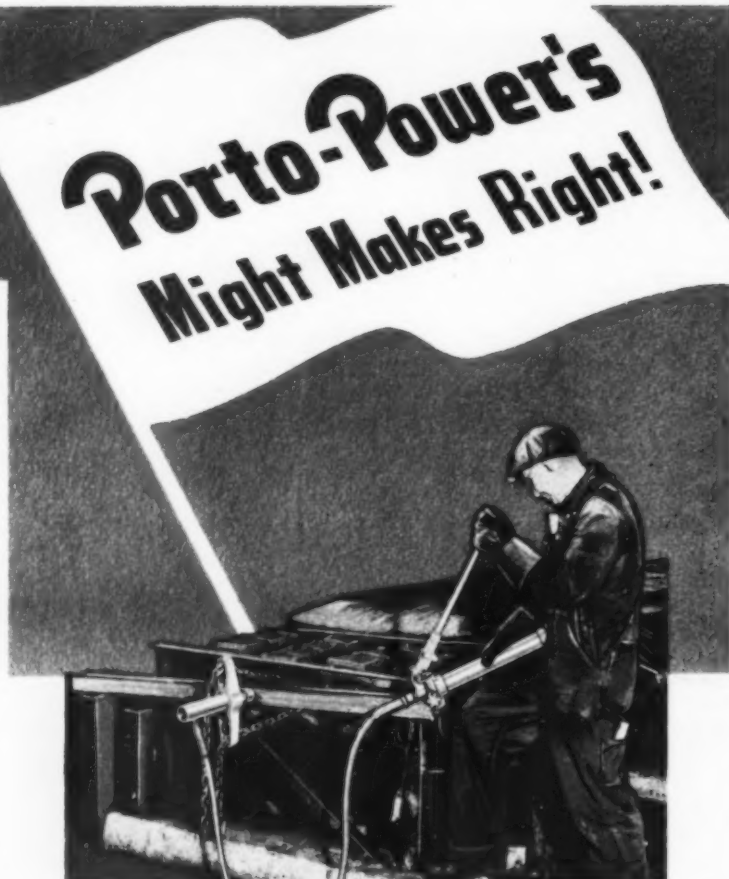
PULLING



CLAMPING



Porto-Power eliminates a lot of inconvenient, dangerous, damaging, time-taking operations and use of costly mechanical devices. Every mill, mine, plant, shop and construction crew is coming to it! See your Blackhawk Industrial Distributor about Porto-Power.



STRAIGHTENING drive shaft after jam up on conveyor. Porto-Power shown making temporary repairs while other work proceeds. Porto-Power eliminates costly overtime and disastrous production shut-downs on vital war work.

YOU can best appreciate this development by first looking at your hand and imagining that it has 40,000* lbs. of power! Think of the push, pull, clamp, press, bend and spread jobs you could then do by applying that much pressure how, where and when you would want it!

And you can with PORTO-POWER which does practically everything the hand can do. Porto-Power can save time on these and scores of other trouble jobs: Pulling gears, pulleys and wheels; lifting machinery; straightening shafts; inserting or removing pins, bushings, bolts and shafts.

*Model S-7B. Others in 4,000, 8,000, 14,000, 20,000 and 100,000 Lb. capacities.

A Product of
BLACKHAWK MFG. CO.
Dept. P2382 • Milwaukee, Wis.



(Continued from Page 86)

"waters," the contractor undoubtedly has potential liability during the construction of certain grading jobs. The purchase of adjacent gravel pits for borrow purposes may so impound or change the normal flow of surface water as to create a distinct liability on a contractor. Similarly the threat to riparian rights may easily preclude the use of certain river bed gravel which was previously planned as a source of supply by the contractor, or the use of certain cofferdam processes in pier foundations.

A somewhat remote possibility lies in the risk a contractor assumes in drilling a well for water supply on construction work. Inasmuch as the water is not used on the property where his well is located, but is rather transported away to adjacent lands, such as on the public highway, the contractor assumes all risk for the lowering of the water table and the resulting injury to adjacent property. Such injuries would, of course, be temporary and the risk therefore of minimum importance.

Mechanic's Liens

Mechanic's liens were a part of the early law in the United States, some statutes dating from the Revolutionary War Period. Generally speaking, a mechanic's lien statute is treated as an extraordinary remedy, being supplemental and as an alternate to the normal common law and statutory remedies available in an action on assumpsit for an unpaid contract. In view of this fact, courts are inclined to construe very strictly and very narrowly the application of a particular statute. It is incumbent upon the contractor to understand fully and appreciate the general legal significance of the mechanic's lien statute in any state in which he proposes to operate. And as his work calls him from state to state, he is faced with the additional burden of this statutory provision in the new states which he enters. Statutes giving remedies to the contractor and subcontractor in one state may be augmented to the extent that an adjacent state will grant a mechanic's lien for the unpaid wages of a timber faller or logger provided that the log in question can be traced from the woods to the construction work involved. In other words, the purchase of finished lumber in such a state would carry liability that all wages had been paid, even to the extent of the woodsman who fell the tree. Furthermore various states have adopted various periods of notice and various methods of protection for the contractor and materialman in the case of dealing with the public as a client. There are times when the use of the mechanic's lien is a most convenient and effective expedient, but the narrow technical requirements of that state law must be precisely fulfilled.

"PITFALLS IN BIDDING" will be continued in an early issue of *Construction Methods*.

"MAN-HOURS"

—the misleading measure
of production



It requires but one eye to see that man-hours alone are no measure of production. The thing that counts is how much that man can produce in one hour.

ALTER EGO: Sure. By one method he may produce two or three times as much per hour as by another method.

Take arc welding. This method results in far greater effectiveness. In joining steel, one welder does the work of two, three or four men using other methods. And he does a better job with 15% to 25% less steel.

ALTER EGO: Then it would seem a better measure for a company's contribution to the war effort would be METHOD-HOURS.

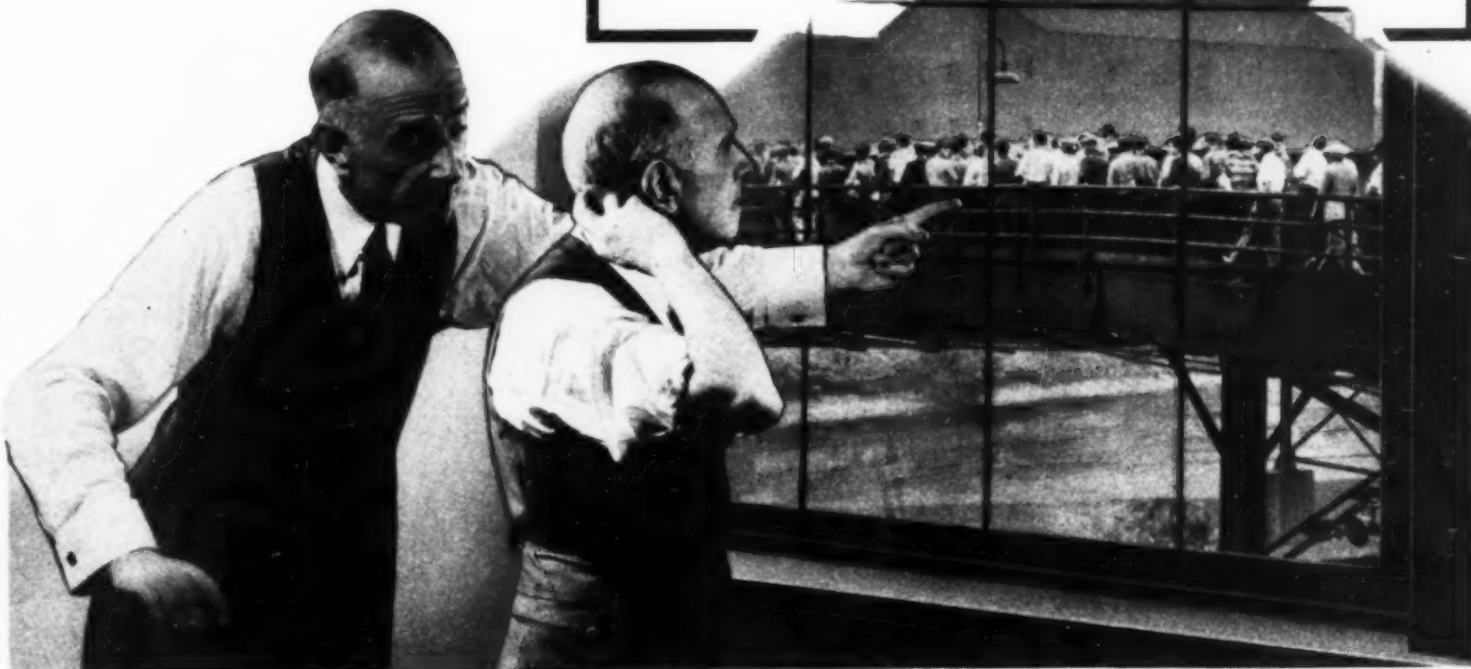
True as gospel. Our whole war production has been zoomed by those who grabbed arc welding as the only way to save our national neck.

ALTER EGO: And later they'll be schooled in an art to save their individual necks when competitive production again seeks profitable markets.

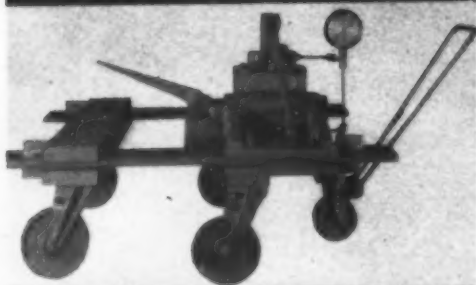
THE LINCOLN ELECTRIC COMPANY
CLEVELAND, OHIO

ALTER EGO: Literally, "one's other self" — the still, small voice that questions, inspires and corrects our conscious action

then I said to myself—
**IT'S METHOD-HOURS
THAT COUNT!**



Adaptable to many uses on CONSTRUCTION PROJECTS



VULCAN PORTABLE Hydraulic PRESSES

MOUNTED ON WHEELS EASILY TAKEN TO THE WORK

This valuable, economical performing, substantial multi-use machine not only saves time, but is highly efficient in the shop or out on the construction project.

Each press tested at our factory to rated capacity and must hold this pressure for more than 24 hours without appreciable drop.

Supplied with a lifting chain, these presses can be quickly slung up and taken down. Equipped with brass pump for added ruggedness and dependability. The gauge is graduated, indicating the total tons on the ram as well as the pounds per square inch.

Available in 60-ton capacity, 6-in. ram diameter, 850 lbs. standard bars, and in 100-ton capacity, 7 3/4" ram diameter, 1550 lbs. standard bars. Quotations will be given on special side bars.

Get your copy of Bulletin No. 10 now to get full details.



VULCAN IRON WORKS
Since 1852

331 North Bell Avenue

Chicago



Illinois

Safe Practices

Cut accidents on 15-mile Rock Tunnel for Aqueduct

By FRED W. STIEFEL
Chief Engineer,
Samuel R. Rosoff, Ltd.,
New York City, N. Y.

(Excerpts from a paper presented March 3 before the Thirteenth Annual Safety Convention and Exposition, New York City.)

THIS DISCUSSION CONCERNS the health and safety measures applied upon a \$20,000,000 contract for 15 mi. of deep rock tunnel constructed under the supervision of the Board of Water Supply as a part of New York City's 85-mi. Delaware River Aqueduct. The tunnel crosses beneath the Shawagunk mountain range from the town of Gardiner to the town of Wawarsing, N. Y., with one shaft in the Wallkill valley, 840 ft. deep; one in the mountain near Lake Minnewaska, 1,551 ft. deep; and one in the Rondout valley, 825 ft. deep. The shafts are 14 ft. in diameter, lined with concrete, and are approximately 5 mi. apart. The longest tunnel heading driven was about 3 mi. The finished inside diameter of the concrete-lined tunnel is 13 1/2 ft.

Hoisting Equipment

The shafts were equipped like those of a mine, with high steel headframes, two hoisting cages and two 7-cu.yd. self-dumping skips under the cages. Cages and skips were in counterbalance and operated by a single drum hoist. The deep (1,551 ft.) shaft hoist was driven by a 700-hp. motor and the two others (825 and 840 ft.) by 500-hp. motors. The cage speeds were 1,000 and 750 ft. per min. respectively. The cage safety devices, a protection against rope failure, were tested every three months by disengaging the cages at the top of the shaft and observing their free drop until the safety dogs, gripping the steel guides, arrested the fall.

Teletalk connections between the hoist operator and top and bottom signal men were maintained so that any hoisting operation was under control at all locations. Telephone connections were installed from the headings to the top and bottom of the shaft, with plug-in extension to the public service telephone line.

The top of the shaft has a wire inclosure with access through a steel gate. This gate was not permitted to remain open, unless what was known as a "suicide switch" had cut off the power from the hoist thus precluding any movement of the cage. The surface supply railroad leading to the cage was guarded by a spring derail switch

(Continued on Page 92)

BYERS CRANES

*Hoist while they Swing,
while they Travel,
while they Steer.*



You can set up a Byers crane on your job to take advantage of every time and money saving economy and to guarantee maximum production because its operations are free, not restricted.

This is another reason why you should investigate Byers 3/8 to 3/4 yd. excavators.

Modern CRANES and SHOVELS

BYERS
RAVENNA, OHIO

The Equipment Distributor can conserve your machinery

Valuable equipment, built for years of service, falls short of requirements whenever neglected. New equipment is highly restricted because it takes materials needed so badly for other war purposes. Present equipment can quickly be restored to dependable operating condition by replacement of worn parts. Gorman-Rupp Distributors stock parts for equipment they sell and repair all makes of machines, Mixers, Pumps, Shovels, etc., at reasonable prices. You will help win the war when you conserve valuable equipment by having a Gorman-Rupp Distributor repair it NOW.

*Keep'em
Pumpin'*



THE GORMAN-RUPP CO.
MANSFIELD, OHIO

G & R Pumps are not "frozen".
All Gorman-Rupp Distributors
have them for immediate delivery.

"An outstanding record" on 385 pieces of equipment

CARS • TRUCKS • CRANES • SHOVELS • DIESEL AND GAS TRACTORS

Macmillan Petroleum Corporation
11, Broadway, New York

Dear Sirs, I am writing to you in regard to the outstanding record of Macmillan Ring-Free Oil on 385 pieces of equipment at Fort Knox, Kentucky, during the past fourteen months. The equipment includes cars, trucks, cranes, shovels, diesel and gas tractors, etc. The record is as follows: 385 pieces of equipment, 2,000 hours of operation, no motor repairs, no overhauls, no oil changes, etc. This is a record that is hard to beat. I am sure that you will be interested in this record. I am sure that you will be interested in this record. I am sure that you will be interested in this record.

Very truly yours,
J. W. Gutermuth
Superintendent Roads and Excavation
Equipment for Whittenberg Construction
Company, George M. Eady Company,
and Highland Company, Inc.

FROM FORT KNOX, Kentucky, comes a letter from J. W. Gutermuth, superintendent Roads and Excavation Equipment for Whittenberg Construction Company, Struck Construction Company, George M. Eady Company, and Highland Company, Inc. He "has been directly responsible for the maintenance and repairs of some 385 pieces of equipment at Fort Knox for the past fourteen months," he writes in February, 1942.

In previous jobs, he says, some oils were good in some types of equipment "and not so good in others." His experience with Macmillan RING-FREE was reason enough for him to use it on \$750,000 worth of equipment at Fort Knox.

On some of this equipment, the factory recommends overhauls at about 2,000 hours. But—

"After fourteen months of day and night operation," continues Mr. Gutermuth, "various kinds of our equipment had a record of more than 3,300 hours without a single motor repair, due to the perfect lubrication of Macmillan RING-FREE Oil."

When a factory representative inquired what oil had been used, Mr. Gutermuth replied:

"Only Macmillan RING-FREE Oil could have performed such an outstanding record."

Whatever your equipment may be, write us, so that Macmillan RING-FREE can do for you what it is doing for others.

MACMILLAN
PETROLEUM
CORPORATION

50 West 50th St., New York
624 S. Michigan Ave., Chicago
530 West 6th St., Los Angeles

MACMILLAN
RING-FREE
MOTOR OIL

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THEY SIMPLIFY JOB-PROGRESS!

• **STERLING** Wheelbarrows provide simple, low-cost material-transport that assures practical job-progress. They need no skilled labor for successful operation . . . they can utilize **ANY AVAILABLE MAN-POWER**, and because they are the "Easy-Wheeling" barrows, they permit any man to do a better day's work, always. **STERLINGS** are veterans of long, successful service in fields of construction and throughout industry. Built to **TAKE IT**, 24 hours a day . . . you can depend on them **NOW**, as usual! **STERLINGS** simplify jobs... Ask **STERLING** how, now!

STERLING WHEELBARROW CO., MILWAUKEE, WIS.

Sterling
WHEELBARROWS



Look for this Mark of
STERLING Quality

... If you want to make speed
profitably . . . **GET DEPENDABLE
EQUIPMENT** . . . Buy the Fast . . .

JACKSON Hydraulic Concrete Vibrator

DESIGNED TO "TAKE IT" 3 SHIFTS A DAY — EVERY DAY

Automatic pressure lubrication—requires no attention. 34-ft. hose — 2 1/4" vibrator head. Adjustable frequency to 6800 R.P.M.—submerged in concrete. Powerful gas engine—4.7 H.P. Long lived, ball-bearing, rotary, hydraulic pump. (Used exclusively by many large defense contractors).



USED EXCLUSIVELY BY
MANY LARGE DEFENSE
CONTRACTORS

ELECTRIC TAMPER & EQUIPMENT CO.

LUDINGTON, MICHIGAN

(Continued from Page 90)

which remained open until the cage was at the proper level to receive cars. The top and bottom signal men stationed in full view of cage operations controlled its movement by means of the Teletalk. Unless all was clear for cage operation, the bottom or top suicide switch took the control away from the hoist operator. The hoist man was stationed where he could readily observe the head-frame operations, such as the dumping of the skip into a 50-cu.yd. bin at the top and the transportation of men. A governor controlled over-speeding the cages. An overwinding device kept the operator from automatically running beyond the proper top position. A horn announced the nearing of the cage to its top position and a dial indicated the precise landing position of the cages as well as other landing points.

Blasting

Fall of rock in tunnelling generally contributes to more accidents than any other cause. A total of 40,000,000 lb. of roof support was used directly to the face, and 60,000 ft. of the 75,000 ft. of tunnel was supported.

A total of 3,100,000 lb. of 40-percent gelatin dynamite was used without an accident due to explosives. The full heading was blasted with one throw of a switch, using delay exploders to a sixth interval. Shunted exploders were not directly introduced in the dynamite but rather placed in inert primers.

Special regulations were enforced in blasting, and all men were retired to a point at least 1,500 ft. from the heading prior to shooting. No explosives were permitted to be handled during an electrical storm. Bronze blowpipes were used to wash dynamite out of unexploded holes. Even though next to falls of rock, explosives contribute to the largest number of accidents, none occurred.

Transportation

In the transportation of men they were warned to ride only on man cars or in the muck cars. The muck cars were of a streamline type, without projections. Safety couplings were used so that no crushing of hands occurred. The cars were of low center of gravity with large wheels; 36-in.-gauge track was installed, using 60-lb. rail. The muck trains operated at an average speed of 8 mph. Locomotives had amber headlights to distinguish them from other tunnel lights.

The concrete trains operated by diesel locomotives ran at a speed of 18 mph. and delivered a maximum of 4,000 tons of concrete per 24 hr. Although about 300,000 tons of concrete have been hauled to date, not a single lost-time accident through transportation occurred. Even though accidents caused by transportation are third in frequency, with good track, heavy rails, low center of gravity equipment, proper signals and careful operation over switches, accidents can be avoided. All locomotive operators had written instructions.

As serious a condition as any encountered

(Continued on Page 94)



PROTECTING WIRE ROPE AGAINST CORROSION



This is Number 11 in a series of informative articles prepared by Macwhyte Wire Rope Company. The purpose of this series is to help wire rope users in these critical times to get the longest possible service from present ropes . . . through making useful facts on rope care more widely known.

The preceding article, No. 10 in this series, pointed out the causes of wire rope corrosion, where and when it was likely to strike. This article, No. 11, tells how to guard against corrosion. This and the previous ten articles in the series is available on request on your company letterhead.

Lubrication . . . its importance

No way has yet been found to remove the "causes" of corrosion. However, there is a method of protecting wire rope against corrosive elements . . . against atmosphere, weathering, or special conditions which subject the rope to either acid or alkaline substances.

That method is . . . *thorough lubrication.*

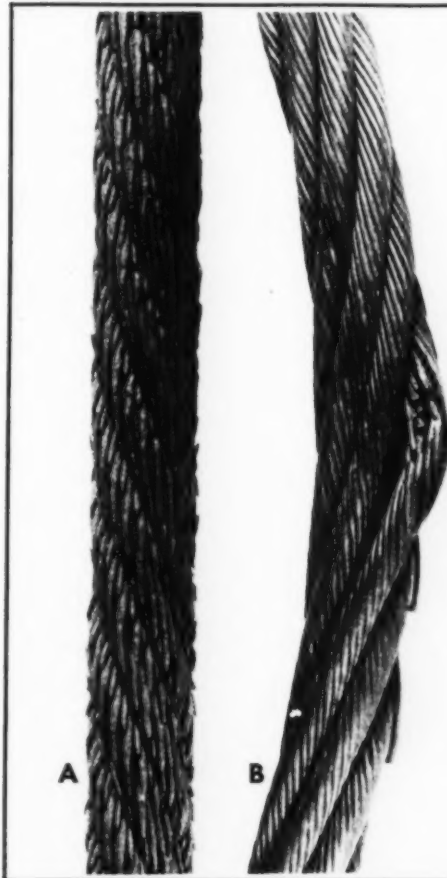
A recent and good illustration of such protective practice is found in the automotive industry. When car makers turned their plants into war production centers they ripped out massive automobile dies and machines worth millions, carted them to parking lots for the duration. When peace comes, back to work they will go.

Meanwhile these machines and dies are being protected against corrosion by a *thick coating of grease.*

Wire ropes, too, are machines. When in use (and more so when inactive) their parts need the protection good lubrication gives. Only when protected by lubrication (which retards corrosion) will they give the best possible service. Today, when we must all conserve what we have, such protection is doubly important.

Corrosion starts as soon as wires and strands are exposed to the elements and usually starts before one is aware of it.

In its early stages, corrosion is difficult to detect. The first signs are general discoloration of the wires of the rope. As corrosion progresses, the wires will become either pitted or covered with a reddish brown substance depending upon whether the corrosion is of an acid or alkaline type.



To prevent such destruction... LUBRICATE

Destruction came to these wire ropes much too soon. It might have been prevented. At an early inspection periodic lubrication would have added countless hours to the service life of these ropes.

A This sample, in addition to showing evidence of wear, is very badly corroded due to having been subjected to corroding conditions of an alkaline nature.

B Lack of lubrication caused the wires in this rope to become rust-bound. Fractures of this character occur when suddenly picking up the load or when the rope is flexed over the sheave, because the rust-bound wires cannot properly slide by each other. Notice the wires show very little evidence of wear.

Curb Corrosion and Conserve Steel

Corrosion is like an incurable disease which creeps up on a person gradually. You may check the damage it is doing, but you can never repair the damage done. Eventually it leads to early death of a rope whose service life could have been so much longer . . . with ordinary care.

Today corrosion is a very real enemy, destroying vital material (steel) needed for victory. If you inspect your ropes regularly, and apply lubricants freely, frequently, you are doing your bit to defeat this wire rope saboteur and get maximum service from your wire rope.

If you have further questions on corrosion (or any wire rope problems) feel free to write us about them. Simply address Macwhyte Company, 2940 Fourteenth Avenue, Kenosha, Wisconsin. Please write on your company letterhead.



Macwhyte's premier wire rope, famous for its strength, toughness, and internal lubrication

Made by

MACWHYTE COMPANY

2940 Fourteenth Avenue • Kenosha, Wisconsin

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Distributors throughout the U. S. A.

Macwhyte Company Manufactures:

MACWHYTE PREformed and Internally Lubricated Wire Rope

MONARCH WHITE STRAND Wire Rope

MACWHYTE Special Traction Elevator Cable

MACWHYTE Braided Wire Rope Slings

MACWHYTE Cables, Tie Rods, Terminals, for Aircraft

BACK UP THE MEN IN THE FIELD

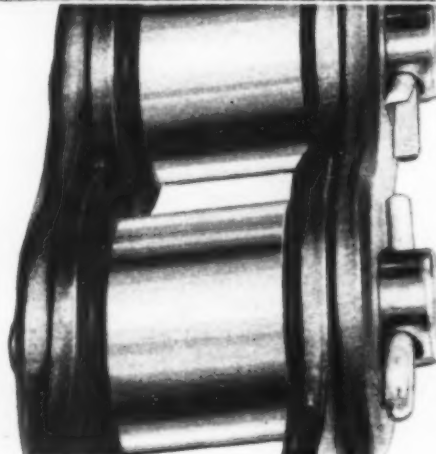
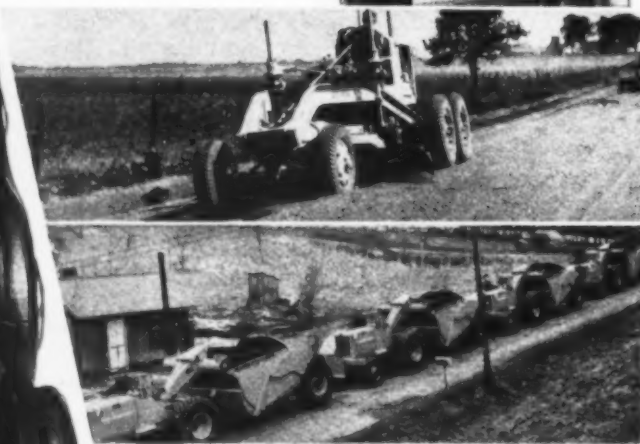
Greater speed requires reliable equipment—a fact well-recognized by leading construction machinery builders, contractors and operators pushing for greater daily yardage.

This is why Diamond Roller Chains are so widely selected as regular equipment by leading manufacturers. Diamond pioneered the many adaptations of roller chain drives—has spent over half a century in developing roller chain. Diamond engineers are well-known throughout the construction field for their field work and cooperation with machinery designers and builders.

It is always good business to provide the best equipment for the working crews—more important today than ever before. . . .

DIAMOND CHAIN & MFG. CO., 418 Kentucky Avenue, Indianapolis, Indiana. Offices and Distributors in All Principal Cities.

DIAMOND ROLLER CHAINS



(Continued from Page 93)

ered in the tunnel was the prevalence of methane gas. The tunnel was as susceptible to a mine explosion as most gassy coal mines. Copious exhaust ventilation confined any explosive gas condition to the face region of the tunnel only. Constant testing by means of flame safety lamps observed by competent fire bosses avoided conditions which otherwise may have resulted in many fatalities. After blasting the heading, the fire boss controlled the return of men to the face.

The abundance of ventilation also enhanced visibility, removed fog and dust, during mucking and drilling operations.

The top signal man, controlling the movement of the cage, was ordered to permit no one to enter the tunnel without being provided with safety hard hats and toe-protected boots. Men were provided with metal inner soles to prevent foot injury from protruding nails.

Diesel Locomotives

One of the most interesting features was the introduction of diesel-operated locomotives underground. Probably 80 percent of the mining states absolutely prohibit the use of internal combustion engines underground. However, with proper, copious ventilation there seems no more reason to exempt them from underground use than the diesel or gasoline vehicles using the Holland Tunnel. They have proved safer and more economical in use than the storage battery and trolley locomotive on main-line haulage. They compel a necessary requirement which has been grossly neglected in many mines in the country, namely, to provide and maintain generous ventilation. This, for all other underground operations, enhances safety, insuring good visibility and eliminating fog, gases, deficiency of oxygen and dust hazards.

Whenever the cage operation was shut down, all work in the tunnel was ordered stopped, so that no injury could occur when a man could not be readily removed. Emergency storage battery lighting system was provided at important locations in case of power failures on utility companies' transmission lines. At all switches, red signal lights were maintained. In one heading, with a steep grade of 2.3 percent, derail switches were installed and sand troughs were placed adjacent to the rails. Through electrical control, the hoist operation was automatically stopped when its brake lining began to have excessive wear. Men working around the shaft were required to wear safety belts to arrest their fall. Under the Rondout valley, numerous water-bearing seams were encountered by drill holes, indicating that great flows of water were to be intercepted at 290-lb. pressure. A 20-ft. concrete safety bulkhead, with heavy steel doors, was installed close to the face of the heading so that flooding of the tunnel could be prevented.

Very good progress in tunnel driving and concreting was maintained. Most accidents were attributable to negligence or disobedience of rules.

HOW AND WHY WILLIAMS' TOOLS AID WAR PRODUCTION

J. H. WILLIAMS & CO., Drop-Forgings and Drop-Forged Tools, BUFFALO, N. Y.

DATA ON "VULCAN" CHAIN PIPE TONGS

There are 6 types of Williams' Tongs, each offering certain advantages for particular classes of work. A knowledge of the features of these various types will enable users to better select the most efficient and economical type for the work at hand.



"VULCAN SUPERIOR": A universal service tong for both pipe and fittings. Has Reversible pipe-and-fittings jaw. Seven sizes, up to 12" capacity.



"VULCAN": The original "VULCAN" Pipe Tong—still the favorite oil-field tongs for general work. Chain swings from center and can be used on either side of the jaw. Eight sizes, up to 18" capacity.



"VULCAN SUPERTONG": Same design as "VULCAN" but forged from alloy and high-tensile steel. Provides 50% greater strength than "VULCAN" with no increase in bulk or weight. Eight sizes, up to 18" capacity.



"IMPROVED VULCAN": Same as "VULCAN" except jaws are double-ended and reversible, providing double service life. Seven sizes, up to 12" capacity.



The "V" recess in "Vulcan Superior" jaws assures quick, positive grip on fittings.

Types of "Vulcan" Chains

While "VULCAN SUPERIOR" and "VULCAN" Tongs are furnished with either Flat Link or Cable Chain, all other types have Flat Link Chain only.

There are three types of Flat Link Chains for Williams' Tongs—"STANDARD", "XTRA-STRONG" and "SUPERCCHAIN". "Standard" Chains are regularly furnished with all except "Supertongs" but "Xtra-Strong" Chains, providing approximately 40% greater strength, can be supplied at additional cost. "VULCAN SUPERTONGS" are regularly furnished with "Superchains". Every "VULCAN" Chain, regardless of type, is individually proof-tested on a standard tension machine to two-thirds of its breaking strain.

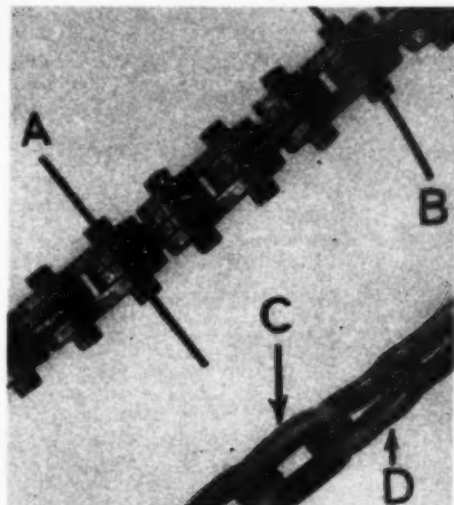
Use and Care of Tongs

In using Chain Pipe Tongs the best gripping position is that which is midway of

the jaw teeth, or rearward therefrom. The bending of the tong handle under load is not evidence of a defect. Such bending is intended to act as a warning and "safety valve" in advance of breakage of chain, which would incapacitate the tool.

In Flat Link Chains on tongs, an occasional inspection of the first two or three rivets and links adjacent to the swinging, or anchor link should be made, since the load is greatest at that point. Badly bowed, or curved rivets indicate that the chain has been loaded almost to breaking strength and is probably unsafe.

In Cable Link Chains, the links give warning by stretching and pulling "rigid" if the breaking point is approached.

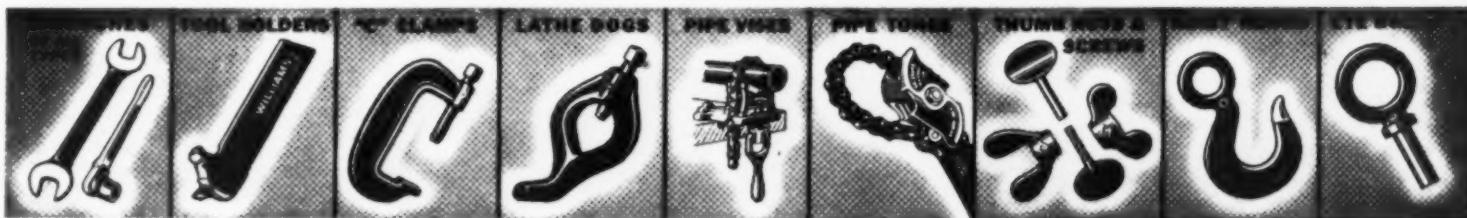


A. Straight rivet indicates chain is safe. B. Curved or bowed rivet—unsafe. C. Safe link indicated by normal shape. D. Link stretched or pulled "rigid"—unsafe.

WILLIAMS
SUPERIOR DROP-FORGED TOOLS

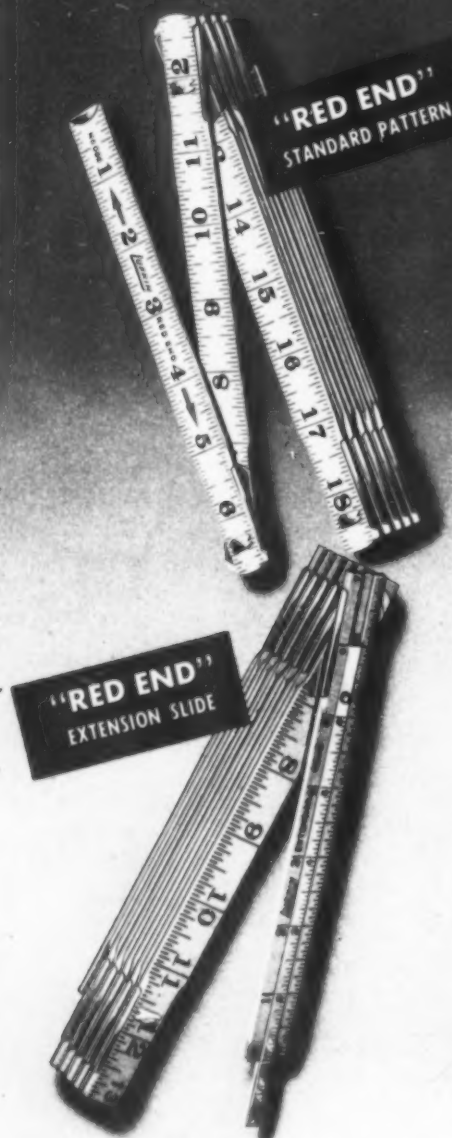
Headquarters
for over half a century for
DROP-FORGINGS and DROP-FORGED TOOLS

Sold by Leading Industrial Distributors Everywhere



LUFKIN

WOOD RULES FOR CONTRACTORS



A few of the many reasons why "Red End" rules are so popular: They have solid brass joints and strike plates. Lock joints reduce end play. Sections are of finest straight grain hardwood. Graduations on both sides. Durable enamel finishes in snow white or cream. A wide variety of graduations.

* See them at your dealers and write us for free Catalog.

LUFKIN
SAGINAW, MICHIGAN • New York City
TAPES • RULES • PRECISION TOOLS

NEWS FROM MANUFACTURERS

About Their Products

The publications reviewed below, will keep you posted on latest developments in construction equipment and materials available for your use.

DIESEL ENGINE LUBRICATION — **Kendall Refining Co.**, Bradford, Pa. (36 pp., illustrated.) After explaining the basic mechanical and operating features of diesel engines, this service bulletin No. 19 discusses principles of lubrication and the development of special diesel lubricants in which additive compounds are incorporated to insure a proper balance among oxidation stability, corrosion resistance, detergency (cleansing action), resistance to wear or "scuffing" and minimum carbon formation. A useful table lists possible engine troubles and oil characteristics required to correct them. Advice is given on the selection of the proper Kendall oil for various diesel and gasoline engine uses and how to get the best results with them. The booklet concludes with some practical hints on diesel engine operation.

★ ★ ★

FASTER FILLET WELDING — **The Lincoln Electric**, Cleveland, Ohio. (18 pp., illustrated.) Bulletin containing 36 illustrations, both photographs and line drawings, describes Fleet-Fillet technique for faster weld production of horizontal and flat-positioned fillet welds. New technique is designed to speed welding without increasing operator fatigue, to reduce amount of electrode per foot of weld and to reduce welding costs. Text and illustrations compare new method with conventional techniques for both single and multiple-pass welds. As described in bulletin, new technique permits welding speeds up to 100 percent faster than conventional procedure.

★ ★ ★

RUBBER CONSERVATION — **U. S. RUBBER CO.**, Rockefeller Center, New York, N. Y. (48 pp., illustrated.) Manual entitled First Aid to Industry in Conserving Rubber gives explicit suggestions for proper care of rubber products from initial design through inventory and storage to use, maintenance, inspection and repair. Completely indexed, booklet includes information on hose of all types; transmission, conveyor and elevator belts; mechanical packings; electrical tapes, wires and cables; molded and extruded rubber goods; rubber-lined equipment; rubber mountings, mats and matting; and rubber and resin-bonded grinding wheels.

★ ★ ★

CONCRETE SPREADER — **Jaeger Machine Co.**, Columbus, Ohio. (8 pp., illustrated.) Folder illustrates and gives specifications for screw concrete spreader built in two sizes, one adjustable for 10-14-ft. lanes and second adjustable for 20-25-ft. pavement. Photographs and data indicate capacity of machine to spread large volume of concrete on both one- and two-course construction.

★ ★ ★

ROAD MAINTENANCE AND STABILIZATION — **Calcium Chloride Association**, Detroit, Mich. (62 pp., illustrated.) Bulletin No. 29, "Surface Consolidation and Maintenance With Calcium Chloride", tells how roads may be improved and surfaces consolidated through proper maintenance under war time restrictions. Booklet presents and illustrates principles and methods of soil-aggregate stabilization for surface consolidation, offers charts for proportioning of aggregate and binder soil, discusses economics of maintenance with calcium chloride, and describes use of pycnometer for simplified field gradation tests.

HOW TO MAKE YOUR Mall TOOLS Last Longer and Work Better

FREE INSTRUCTION MANUALS are yours for the asking. Write for your copies TODAY

Mall Instruction Manuals complete with easy-to-understand diagrams and practical suggestions covering the operation and maintenance of Mall Tools are available for Mall Concrete Vibrators, Concrete Surfacers, Portable Electric Mall Saws and Drills, Door Mortisers, Door and Surface Planes, Flexible Shaft Grinders and Polishers, as well as Chain Saws.

In addition, factory-trained representatives in principal cities are waiting to service your tools. A minor adjustment today may save a major repair job tomorrow and conserve critical materials for War Production.

Write AT ONCE for your FREE copies of Mall Instruction Manuals giving the serial number of your Mall Tools. Name of Mall Service Base nearest you will be furnished upon request.

MALL
TOOL COMPANY
7757 South Chicago Ave.
CHICAGO • ILLINOIS



MAKE IT COMMERCIAL

LINER PLATES AND SUPPORTS FOR SMALL DIAMETER TUNNELS

● On those many small tunneling jobs that you handle, as well as the larger ones, turn to **COMMERCIAL** for liner plates and supports . . . they're better in design, manufacture and easier to install. Take this small water diversion shaft . . . it demonstrates the clean, clear working space that **COMMERCIAL** Supports provide . . . the safety obtained . . . the all-around easier construction. In short, **COMMERCIAL** plates and supports represent your soundest choice for all types and sizes of tunnels, regardless of ground conditions. Before your next tunneling job, call in the **COMMERCIAL** man . . . he'll give you complete details.

The **COMMERCIAL SHEARING & STAMPING CO.**
YOUNGSTOWN, OHIO

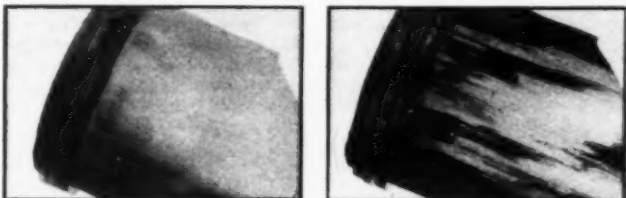
STANDARD OIL'S FLEET CONSERVATION SERVICE NOW OFFERS: NEW HEATPROOFED **STANOLUBE H.D.**

Beats heat - Cuts wear - Cleans engines

Civilian use restricted to fleet operators

• A GREAT NEW OIL—a heat-fighting oil, with protective powers beyond anything previously known—Stanolube H. D. is a war-time development. American tanks using it will be free from lubricating difficulties which have proved fatal to the tanks of enemy nations. Although other civilian use is now restricted, Stanolube H. D. is made available to fleet operators, because of the vital need of conserving your type of equipment.

Carbon—varnish—engine deposits—responsible for a large part of your maintenance expense and short equipment life—practically disappear when you use the new Stanolube H. D. It was developed just when you need it most—to keep your engines rolling—to reduce overhauls, part replacements, and shop time.



The two pistons above took the same punishing engine tests—operating for the equivalent of 3,600 miles at 60 m.p.h. The piston at left, showing no signs of varnish or ring deposits, was lubricated with Stanolube H. D. The piston at right, badly coated, is typical of conditions found with other heavy duty oils tested.



Used on a severe Diesel engine destruction test—500 hours of operation at 2000 r.p.m. under full load—piston at left shows how well Stanolube H. D. protects against destructive engine heat compared to other heavy duty oils.

25,000,000 MILES OF PROOF

Laboratory experiments indicated that Stanolube H. D. was an outstanding oil. But that wasn't enough evidence. It had to prove itself in service.

Standard Engineers started looking for trouble—fleets that were hard to lubricate—fleets with varnish problems—sludge conditions.

Before Stanolube H. D. was offered for sale it had operated more than 25,000,000 miles on the toughest lubricating jobs that could be found. And every mile gave added proof that Stanolube H. D. Beats Heat... Cuts Wear... Cleans Engines.

GET ALL THE FACTS ON HEAT- PROOFED STANOLUBE H. D.

This folder "Beat Heat—Your Engine's Enemy No. 1" tells why modern heavy duty gasoline and Diesel engines last longer with this heatproofed oil—tells how it reduces engine deposits that cause high maintenance. Send for a copy.



HERE'S HOW TO GET STANDARD'S AUTOMOTIVE ENGINEERING SERVICE

If you are located in any of the middle western states listed below, call in a Standard Automotive Engineer. Let him explain fully just what he does to help operators conserve equipment.

Just write your local Standard Oil Company (Indiana) office, or 910 South Michigan Avenue, Chicago, Illinois, for the Engineer nearest you. In Nebraska, write Standard Oil Company of Nebraska at Omaha.

COLORADO • ILLINOIS • INDIANA • IOWA • KANSAS • MICHIGAN
MINNESOTA • MISSOURI • MONTANA • NORTH DAKOTA • WYOMING
SOUTH DAKOTA • WISCONSIN

• Sign up your fleet in the Office of Defense Transportation's Truck Conservation Corps. Help in this vital war effort by keeping your trucks rolling for the duration.

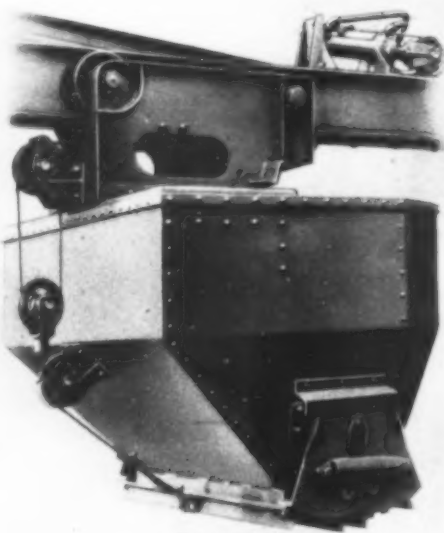


OIL IS AMMUNITION...USE IT WISELY

Copyright 1942 Standard Oil Company

STANDARD OIL COMPANY (INDIANA) FLEET CONSERVATION SERVICE

15 New Boom Bucket Advantages



Pat. Appl. for

...a combination never before offered on any paver

Ransome's New Hydraulically Controlled Boom Bucket now gives you these profit increasing advantages...

- » Eliminates split batches.
- » Can discharge small portions of concrete, close doors and move boom to other locations.
- » Saves time of bucket travel for split batches.
- » Doors open or close to any degree at any position on the boom.

These are but four of fifteen reasons why you should investigate. For the complete story...

Write for



Bulletin No. 195

Ransome 34^E Single and Dual Drum Pavers

RANSOME CONCRETE MACHINERY COMPANY
Dunellen New Jersey

LESSONS IN PRACTICAL ARC WELDING — Hobart Bros. Co., Troy, Ohio. (188 pp., illustrated; price 75c.; author, W. J. Chaffee.) This book contains complete series of 41 arc-welding lessons offered at Hobart Trade School. Chapter headings include preliminary instructions; starting and manipulating arc; welding common joints with bare electrodes; welding light-gage sheets with coated electrodes; general welding with coated electrodes in flat, horizontal, vertical and overhead positions; pipe welding; welding cast iron; special practice and tests. Text also contains a suggested classroom procedure and ready reference index.

★ ★ ★

REPAIR OF WAR-DAMAGED PIPE LINES — Johns-Manville Corp., 22 East 40th St., New York, N. Y. (92 pp., illustrated.) Detailed treatment of restoration of war-damaged water mains by a wide range of applications of Transite pipe. Profusely illustrated with drawings and photographs, it is designed to provide information needed by officials responsible for maintenance of service in cities, as well as at military flying fields, bases and other critical areas vulnerable to bombing attacks. Manual was prepared as a result of numerous letters from waterworks superintendents in various parts of country who considered possibility of bombings and wanted to be prepared. Written especially for users of Transite asbestos-cement pipe, manual is divided into five parts: First shows actual photographs of bomb damage; second, typical damage suffered by pipe lines; third, temporary and permanent repairs; fourth, installation methods; and fifth, a group of appendices treating of all repair parts and tables referred to in text. Typical experiences with asbestos-cement pipe in bombed British cities are also cited. Manual analyzes types of damage most apt to result from direct bomb hits or artillery fire and suggests various temporary repairs designed to restore damaged lines as quickly as possible, as well as permanent repairs. Included with suggestions are detailed instructions, illustrated with photographs and diagrams.

★ ★ ★

REVISED ASPHALT SPECIFICATIONS—The Asphalt Institute, 801 Second Ave., New York, N. Y. Twenty newly-revised Asphalt Construction Specifications have just been published. In their scope they range, in seven classifications from high types "A" down to surface treatments "S." Revision was made to incorporate: (a) present U. S. Bureau of Standards Simplified Practice relating to the gradation of aggregates; (b) most recently developed equipment essentials; and (c) latest Asphalt Institute recommendations, based upon correlation of its laboratory studies and field engineering experience.

★ ★ ★

*On-the-Job
Maintenance*

**Keeps Tractors
Scrapers and Graders
Rolling**

(Continued from Page 52)

right, thus equalizing wear on both steering clutches.

MAINTAIN ADJUSTMENTS. Proper track tension, accurately adjusted seals, wear take-up adjustments all are necessary and should be inspected and

(Continued on Page 100)

IN THE SPOTLIGHT



*Exclusive Features
of "Ames"
Solid Shank Shovels*

- 1 The blade and socket made from one solid piece of steel.
- 2 The Shock Band which adds substantially to the handle strength.
- 3 All grades heat treated.
- 4 Labels die pressed into wood in two colors.
- 5 D Handle shovel equipped with the famous ABW Armor-D Handle.

Add to these features the quality of the steel and the second growth Northern Ash handles and you have a shovel that is tough!

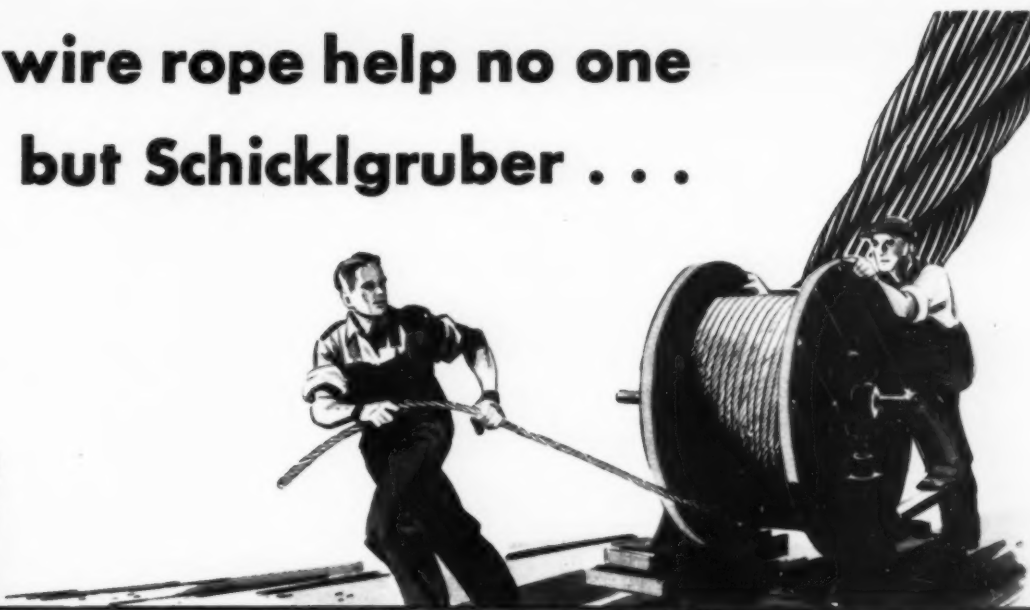
Ask your jobber

AMES PRODUCTS
SHOVELS SPADES
SCOOPS FORKS
HOES RAKES
POST HOLE DIGGERS
AGRICULTURAL HANDLES



AMES BALDWIN WYOMING CO.
PARKERSBURG, W. VA. NORTH EASTON, MASS.

"KINKS in wire rope help no one but Schicklgruber . . .



Avoid them and you save both Time and Steel

To the experienced wire rope user it may sound trite to say wire rope is a costly machine and must be treated as such. But there may be young fellows under you handling Roebling rope today who haven't learned by experience, and it's up to you to see that nothing they do will waste the valuable time and rope steel so vitally needed. Unloading the reel is just one way that a beginner may damage a rope. So tell him first that a reel of rope, like a motor or other piece of valuable equipment, should be handled carefully and not dropped from a truck or platform. Nor should it ever be moved by *prying against* the coiled rope.

But it's in kinking that the most serious damage is likely to occur. A kink starts as a loop like this!

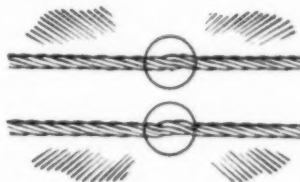


If it gets pulled tight, the damage has been done. The uniform relative position of the strands and wires has been disturbed—causing unequal stress distribution and abrasive wear that brings early failure at this point when the rope is put to work.



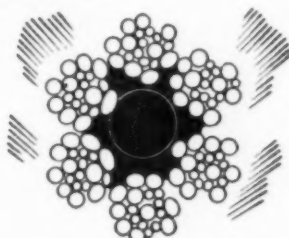
Even though you think you've straightened out a kink, looseness and high strands will appear. Because as the rope straightens

after kinking, an extra twist is thrown into the strands that can never be removed. Here's a kinked rope under 10,000 pounds tension, and below it the same rope after the tension had been relieved . . .



But notice that the kink remains. That means very severe abrasive wear on the high strands and abusive strain on the drawn strands since they carry more than their share of the load. To show you what happens to the drawn strands inside the rope, here is one cut through at the kinked section.

Notice how the hemp center is compressed; some strands are drawn in and others forced out.



All right, kinks are wasteful...but it's just as easy to avoid them as it is to put them in. Remember, kinks start as loops—caused in

most cases by taking rope from a stationary reel or coil. *The remedy is simple*—always unwind wire rope straight ahead by rotating the reel or coil. Don't let the reel get going faster than your rope is coming off. Always keep some tension on the rope if at all possible. Most people put a shaft through the center of the reel and jack it up—as shown in the big illustration at top. If it's in a coil, simply roll it along the floor like this . . .



It's as easy as that to avoid kinking during installation (where most kinks occur). Have these rules followed by every man who handles it, and you'll be on the way to getting all the *extra* service that's built into every inch of wire rope that bears the Roebling trademark."



JOHN A. ROEBLING'S SONS COMPANY
TRENTON, NEW JERSEY
Branches and Warehouses in Principal Cities

- ★ PROMPT SERVICE
- ★ on essential orders
- ★ from warehouse
- ★ stocks or mill



ROEBLING
"Blue Center"
STEEL WIRE ROPE
PREFORMED OR NON-PREFORMED

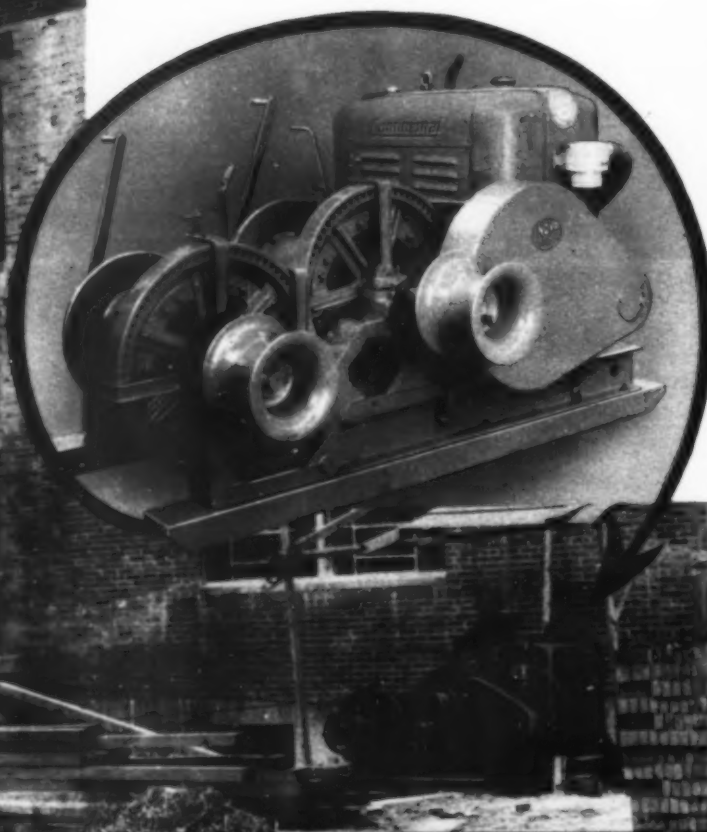
Continental Red Seal Engines

Speed Material Handling

with Novo Hoists

This smooth, fast, safe-action Double Drum hoist is manufactured by the Novo Engine Co. of Lansing, Michigan.

When engines, because of scarcity of materials, must operate economically over a long engine life, it is sound business reasoning to insist on Continental Red Seal Power.



Continental Motors Corporation

MUSKEGON MICHIGAN

(Continued from Page 98)

attended to at short regular intervals especially with older equipment.

TRACTOR CLUTCHES. Tractor clutches, both master and steering, are made to operate in either of two positions, engaged or disengaged, and when operated only partially engaged are subject to excessive wear. Never "ride the clutches"; disengage them completely and engage them completely—*always*.

ENGINES

COLD WEATHER STARTING. Check engine to see that it is ready for starting. Do not crank engine excessively with battery. Never operate an electric starter more than 30 sec. continuously. Then allow not less than 15 min. for battery and starter to cool before running starter again. Allow engine to run at about one-third throttle until it runs evenly; then open throttle until proper engine temperature has been reached.

BATTERY. A fully charged battery will have a hydrometer reading of about 1.280. It should not fall below 1.225, especially in cold weather. Don't fill batteries with water from untested sources.

ELIMINATE IDLING. Idling an engine, either gas or diesel, is extremely injurious, causing crankcase dilution, carbon deposits, sticking rings, etc. In addition, it is extremely wasteful of fuel. Shut your engine off whenever possible. Most modern tractors now have electric starting; if not, it will pay you to crank them by hand.

Whenever it is necessary to let the engine idle a few minutes, shift the transmission into neutral and engage the master clutch. This saves pilot bearing wear and prolongs clutch life.

CLEAN FUEL. Because of the many close tolerances on diesel engine injection equipment, clean fuel is absolutely essential. Dirty fuel can cause a tremendous amount of trouble, expense, and delay. Keep it clean, at all times by providing suitable storage capacity to allow fuel to settle. Draw fuel from a level several inches above bottom of storage tank and keep all filling equipment clean.

DIESEL FUEL. If diesel-powered equipment is being operated in extremely cold weather, be certain that the fuel contains a sufficient quantity of lubricant to prevent pumps and injectors from sticking. In some instances under such conditions it may be advisable to add a pint of good, light lubricating oil to each tankful of fuel. However, in all cases of doubt, consult the equipment manufacturer for his fuel recommendations and suggestions.

GASOLINE. It is very likely that only lower grades of gasoline soon may

(Continued on Page 102)

Ammunition of War

for the home front!

Today there is but one goal for the men and machines of America: *Production and still more production!*

As raw materials roll in and the finished sinews of war roll out in an ever increasing flood, the construction industry faces its biggest test. No need to tell construction men the seriousness of the situation. With the manufacture and sale of new mobilecranes, trucks, etc., restricted, existing equipment has *got* to stand up!

And if it has to stand up, how about replacement parts? They're also ammunition of war—for the home front!

Forward-looking Timken, with the finest research and manufacturing facilities in the industry, is helping win the war on the home front

not only with time-proved, quality-controlled original equipment parts, but also with a complete program for proper A. M. (Axle Maintenance).

Practicing good A. M. and using Timken original equipment parts is one of the best ways of all to keep *your* equipment rolling for VICTORY. It will pay you—in longer, more dependable service—to insist on genuine Timken parts and to practice proper A. M. Write us for complete information on how we can help you.

TIMKEN AXLES

THE TIMKEN-DETROIT AXLE CO., DETROIT, MICH.
WISCONSIN AXLE DIVISION, OSHKOSH, WISCONSIN

Timken: Builders of Battle Axles!

A.M. (Axle Maintenance) KEEPS 'EM ROLLING



TURN IN ALL YOUR SCRAP-- IT'LL SHORTEN THE WAR

LET'S FACE THESE FACTS

It takes about a half-ton of scrap steel to make a ton of new steel—for ships, trucks, tanks, and guns. Scrap steel speeds production. Waste materials—scrap metals, rubber, and all the rest—are the lifeblood of America's war industry. The demand is great, the supply dwindling.

YOU CAN HELP

Check your worn-out or obsolete equipment. If it cannot be used, why not scrap it? Collect worn-out tools, old pipe, structurals and other useless material, and turn it over to the scrap dealer promptly. Urge your business associates to turn in their scrap as fast as it can be collected. (All scrap steel collected will be purchased by the steel industry at the government-controlled price.) Also encourage your employees to collect all their old rubber and discarded metal household equipment and get it to a local salvage committee, charity or junk dealer.

A JOB FOR EVERYONE

Collecting scrap materials is a job that no one group can do alone. Every pound turned in will help shorten the war. It's a job that every citizen, every company, and every industry with a stake in America's future must share in doing—today and every day for the duration. The Armco Drainage Products Assn., 775 Curtis St., Middletown, Ohio.



TURN IN YOUR SCRAP

This advertisement is in support of the Salvage Program of the Bureau of Industrial Conservation, the War Production Board.

(Continued from Page 100)

be available; if this situation develops it will require retarding the timer to eliminate the knock. Lack of lead in the fuel will also reduce the power output slightly. Where used in trucks and motor patrols gas mileage will also be reduced.

RADIATORS. Keep radiators free from leaves, paper, bugs and other obstructions. Flush the radiator occasionally with radiator solutions available commercially. Follow up by a wash with sal soda and clean water. Don't fill radiators with dirty creek water.

CLEAN AIR. Even more important than clean fuel is clean air. Dirt in the fuel will probably stop your engine. Dirt in the air, unfortunately, won't—not now—not until the engine is worn out. And it doesn't take long. This means a complete overhaul.

So keep your precleaners in good condition; if damaged, install new ones. If the precleaners are of the glass jar type, be sure the machine is not operated with a broken jar, and that the jar is tight on a good gasket. Unless the dust container is air tight, the precleaner is of no value.

Oil-bath air cleaners should be serviced faithfully as often as required to keep the oil in the bowl in good condition. The type and viscosity of the oil must be as recommended by the manufacturer. Don't put too much oil in the cleaner if you are working the vehicle on very steep grades because of the danger of drawing oily particles of dirt and dust into the motor.

SCRAPERS

CUTTING EDGES. Replace or turn cutting edges before wear develops on bowl. It is cheaper to replace a cutting edge than build up a bowl.

DROPPING BOWL. On tilt-out scrapers, after dirt has been discharged, do not drop bowl and catch it with winch or hydraulic system just before it reaches bottom. This practice causes excessive cable wear and subjects the winch or hydraulic system to severe and possibly injurious shocks.

WINCH ADJUSTMENTS. Keep winch well greased and properly adjusted to reduce cable wear.

EXCESSIVE LOADS. Excessive overloads cause rapid wear, severe strain and breakage, not only on the scraper itself but also on the control equipment and tractor. *The last 1/2-yd. of earth in most instances will not pay for the strain and wear and tear placed on the entire outfit.*

REDUCE SHOCK LOADS. When operating in rock use particular care. Take it easy, to avoid damaging shock

(Continued on Page 104)

A BIG MOUTHFUL WITH EVERY BITE!

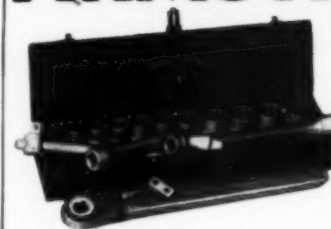


You can depend upon the greedy jaws of Industrial Brownhoist clamshell buckets to speed up your material handling. Their deep clean bites practically eliminate hand shoveling. Fast opening and closing action. Extra sturdy. Minimum rope wear and maintenance. Standard types (rope-reeve, power-wheel and link-type) in stock for immediate delivery. Write for further information.

INDUSTRIAL BROWHOIST
DAY CITY, MICH. • DISTRICT OFFICES
NEW YORK, PHILADELPHIA, PITTSBURGH, CLEVELAND, CHICAGO

ARMSTRONG

WRENCHES



- open end
- Box Socket
- Detachable Socket
- Construction Ratchets

There are ARMSTRONG Wrenches for your every need and each is the finest tool of its type.

ARMSTRONG Socket Wrenches extensions and handles are Chrome-Vanadium Steel. Ratchets are drop forged steel and the patented ARMSTRONG Drivlock locks sockets, driver, ratchets and handles to each

other — will not knock or pry apart, sockets can not fall off. ARMSTRONG Giant Construction Ratchets are drop forged steel. Nut sockets are machined from solid bar stock.

ARMSTRONG Drop Forged



Structural and Construction Wrenches come in several types, in high carbon or Chrome-Vanadium steel. Large stub end box socket wrench takes long slip over handles.

Write for Catalog



ARMSTRONG BROS. TOOL CO.
"The Tool Holder People"
334 N. Francisco Ave.
Chicago, U.S.A.
Eastern Warehouse & Sales:
199 Lafayette St., New York

25 DAYS SAVED

for the U.S. Government

**THIS SPACE WAS FOR
A PICTURE OF THE JOB**

... But we can't show a picture.
We can't tell where the job is.
We can say that—

- ▶ It's a disposal plant at an Army Air Base.
- ▶ It's a 100% Atlas High-Early cement job.
- ▶ It's another example of fast wartime building under pressure of time—with Atlas High-Early cement.

THE contractor on this particular disposal plant job turned it over to Uncle Sam nearly a month ahead of time, thanks to Atlas High-Early cement.

He saved time because he could remove his forms sooner than with normal portland cement. He speeded up his concreting all along the line. And he was able on first pours to get footings in before

water in lower part of the grade stopped concrete work.

Costs were lower, too, on this job, as they often are when Atlas High-Early cement is used. There was approximately a 15% saving in form costs.

Atlas High-Early cement is one answer for SPEED with economy—in new building, converting, or repairing—in summer or winter.

On your next "Rush" contract, big or little, use Atlas High-Early cement. Universal Atlas Cement Company (United States Steel Corporation Subsidiary), Chrysler Building, N. Y. C.

OFFICES: New York, Chicago, Philadelphia, Boston, Albany, Pittsburgh, Cleveland, Minneapolis, Duluth, St. Louis, Kansas City, Des Moines, Birmingham, Waco.

CM-H-47

ATLAS HIGH-EARLY CEMENT

A UNIVERSAL ATLAS PRODUCT



Salvage Steel Pipe

with a

Simplex Pipe Puller

Tremendous power (20-ton) ratchet screw loosens pipe. Fast lever jack backs it out. For low cost salvage or replacement of service pipe.

Send for Bulletin U-42

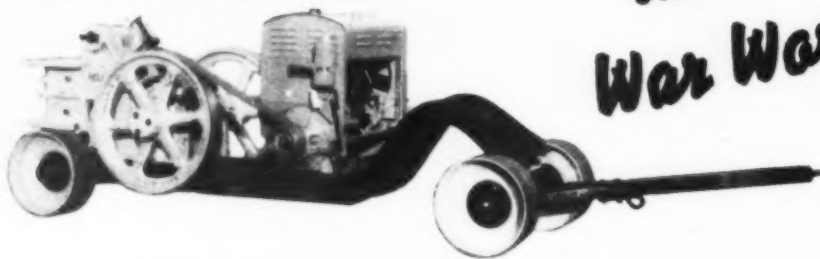
Templeton, Kenly & Co.
CHICAGO, ILL.

Better, Safer Construction Jacks Since 1899



Reliance

will speed
that
War Work!



PORTABLE CRUSHING UNIT with V-BELT DRIVE

More
CRUSHING with
least
EFFORT and POWER
plus
RUGGED DURABILITY

This speedy Reliance Portable Unit can be used with *equal profit* — 1st — as a Crusher alone, or — 2nd — in combination with Elevator, Chute, Screen, etc. Note the *low* feed opening at a *safe* distance from the balance wheels. Note the reliable *power-producing* V-Belt Drive. Note the low center of gravity for stability. For strength, simplicity and economy you can't beat this or any other Reliance.

● OTHER PRODUCTS — Reliance offers a complete line of Rock Crushers; Bucket Elevators; Revolving Screens; Storage Bins; Pulverizers; Chip Spreaders; Heating Kettles; Bin Gates; Feeders; Belt Conveyors; Grizzlies; Air Separators; Sand and Gravel Spreaders; Wash Boxes.

UNIVERSAL ROAD MACHINERY CO.

Kingston, N. Y., U. S. A.

DISTRIBUTORS IN ALL PRINCIPAL CITIES OF U. S. A.

(Continued from Page 102)

loads. Tires are also more readily cut, bruised and damaged when operated on rock unless care is taken.

REDUCE STRAIN. If operating in exceptionally hard material it is advisable to use a ripper to make loading easier.

GRADERS

DON'T OVERLOAD. If your engine lugs down or your wheels spin, ease up on the blade. Take a smaller bite or adjust your blade angle slightly, thereby decreasing the load on your machine and reducing the possibility of breakage or damage.

LUBRICATION. Study the lubrication charts and instruction books. Follow schedules *closely*. Use *only* the specified lubricants and lubricate at the intervals specified.

ADJUSTMENTS. Do not allow bolts to become loose or fall out, subjecting adjacent parts to rapid wear and breakage. Most points on a grader subject to wear are provided with take-up adjustments. Check these points regularly and make adjustments, however, minor, immediately.

CLUTCHES AND BRAKES. Check clutches and brakes frequently. Don't let them drag. Operators should also be instructed not to "ride" the clutches and brakes.

TIRES. The greatest enemies of tire life are overloading and improper inflation. Don't carry excessive loads and see that tires are inflated properly — not over-inflated nor under-inflated as either can be equally injurious. Check tire inflation frequently and regularly. Avoid excessive speeds, spinning wheels, fast starts, sudden stops, etc. If your grader has leaning front wheels, use them—don't allow the front tire to rub against the bank.

Frequently dirt clogs up and dries between tires and the scraper bowl. The rubbing action caused thereby causes excessive tire wear. Keep tires and adjacent areas clean. Provide effective tire scrapers if machine is not so equipped.

WHEELS. Keep drive wheels tight on the axles. Loosened wheels will quickly damage bearings, injure brakes, and increase tire wear.

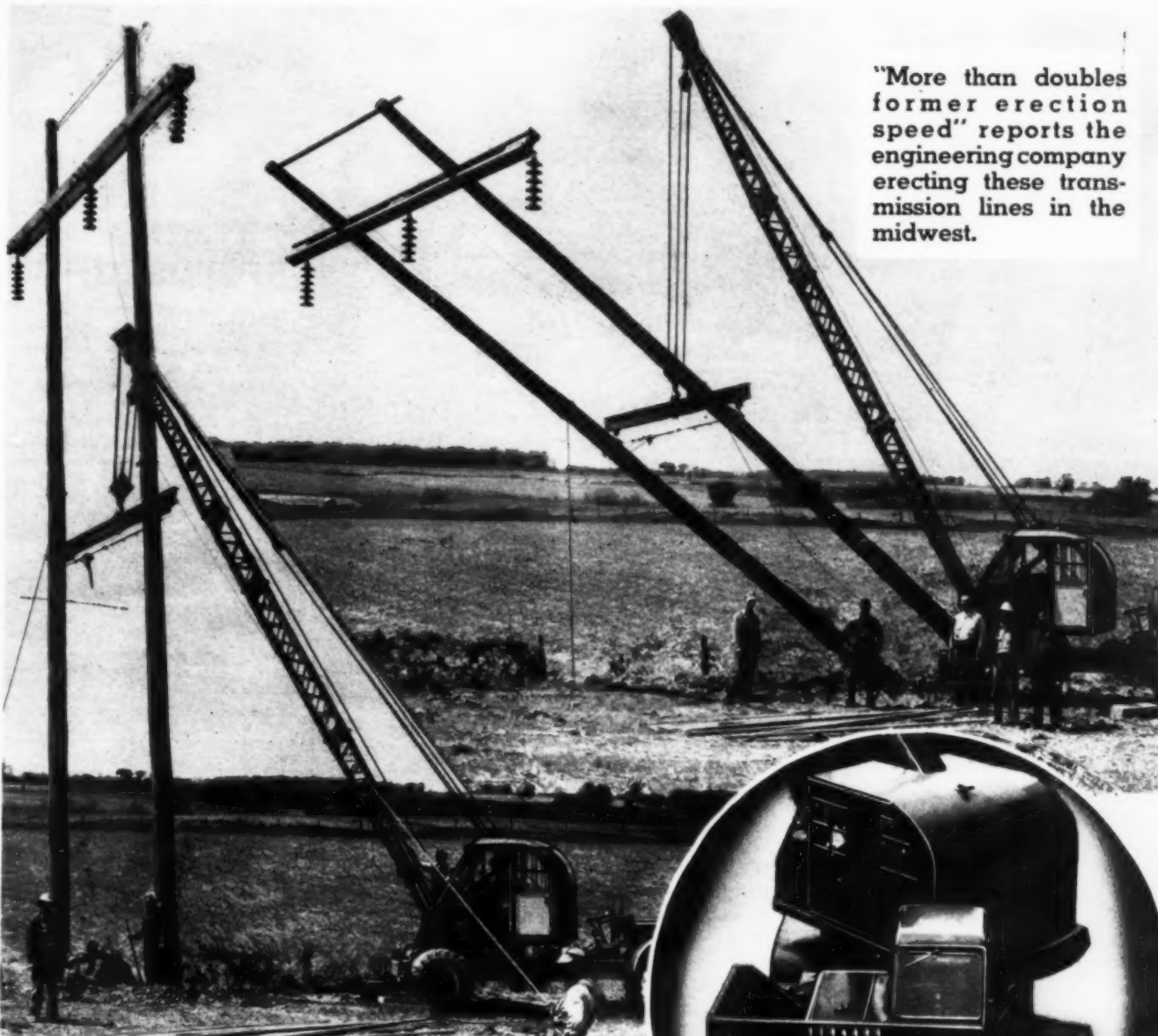
CUTTING EDGES. Check cutting edges and replace or reverse them before injuring the moldboard.

ENGINE. Same general instructions as apply to tractors. Regular inspection, immediate repair and adjustment, clean fuel, no idling and regular lubrication.

These suggestions are, of course, only of a general nature to indicate the type

(Continued on Page 106)

Stick 'Em Up... **FASTER!**



"More than doubles former erection speed" reports the engineering company erecting these transmission lines in the midwest.

Up they go! . . . these power poles — or skeletons of armament plants — or ships and more ships — or carloads and cargoes — all sped toward early "delivery" with the aid of Michigan Mobile Cranes. Made in $\frac{3}{8}$ yard and $\frac{1}{2}$ yard capacities, these Air-controlled "Michigans" are pace-setters

in countless war-time operations today. Your own war program may need Michigan mobility, speed and capacity . . . Toward this end, we offer you the valuable suggestions and cooperation of our engineering staff . . . Write today for Bulletin CM-82 and complete data.

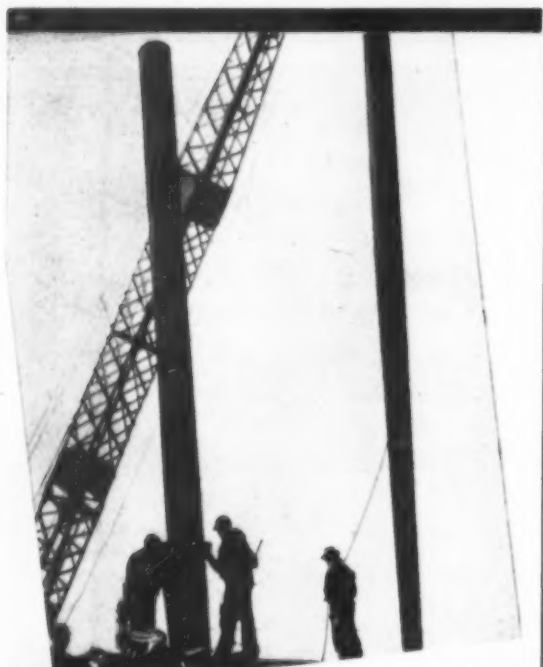
MICHIGAN POWER SHOVEL COMPANY, Benton Harbor, Michigan

MICHIGAN

AIR-CONTROLLED

SHOVELS - CRANES - CLAMS

DRAGLINES - TRENCH HOES



TVA Relocates a Railroad 3 NEW BRIDGES on UNION METAL MONOTUBES!

WHEN TVA, in the course of one of its projects, found it necessary to relocate a portion of the Southern Railroad near Harriman, Tennessee, three new bridges had to be built.

On this project, as on several before it, TVA used Union Metal Monotubes for the installation of cast-in-place concrete piles. In building the bridge pictured below, sturdy, tapered Monotubes were driven under the stub piers or abutments at both ends, and were also carried directly up into the two bents serving both as columns and supporting pile.

Today, as the construction industry works round the clock to rush completion of the projects so vital to victory, Union Metal Monotubes are featured in more and more piling specifications—for time-saving reasons. And over and over again it's demonstrated that Monotubes speed foundation work these four ways . . .

1. **SPEEDY Handling.** Monotube steel casings are light in weight for fast and economical handling.
2. **SPEEDY Driving.** Tapered Monotubes are so strong and rigid they require no heavy core or mandrel and can be driven with average job equipment (crawler crane, equipped with standard leads and hammer).
3. **SPEEDY Extension.** Use of Extendible Monotubes permits installation of varying pile lengths on the job without delay or waste—permits quick installation even in low headroom.
4. **SPEEDY Inspection.** Hollow, tubular design enables you to inspect casing quickly and thoroughly from top to toe, prior to concreting.

Whatever your foundation job, Monotubes come in a gauge, taper, and length to satisfy every requirement. And experienced Union Metal foundation engineers are always at your call. Write for Catalog No. 68A!

**The UNION METAL
MANUFACTURING CO. • Canton, O.**

More Production Means Axis Destruction!

Design Engineers: TVA Engineering Division



(Continued from Page 104)

of cooperation desired from operating and maintenance personnel. The most important thing to remember is for all to work together in starting such a program. Its success depends upon full team work among operators, oilers and mechanics to the point where one will inform the others when a machine needs attention.

Most operators are mechanically inclined and are operating because they like that type of work. Most of them have a pretty healthy respect for machinery and will not deliberately abuse it. Excessive wear and tear, breakage and short equipment life are due to lack of proper instruction, training and proper supervision. It is, therefore, vitally necessary that operators and mechanics receive proper training and instructions on the equipment in their hands.

When a machine does need attention, take care of it immediately. A small adjustment, if neglected, may cause a whole series of breakage and costly repairs.

★ ★ ★

Shovel Cycles

(Continued from Page 67)

ways from the end of the dipper handle will cause greater overturning movements on the shovel, will produce greater pintle reactions and will place greater strains upon all parts of the machine. Since the modern shovel can so quickly move up, there is no excuse for not always putting the shovel in its most effective digging position.

Effective Use of Bail Pull

Bail pull exerted on a shovel dipper is fixed by the power unit of the shovel and the designer's application of this power. The bail pull is used to lift the dead weight of the dipper and handle and to force the dipper through the material in order to fill the dipper. The force which is available for filling the dipper is termed the digging effort. The operator in his handling of the dead weight determines the amount of digging effort which he can have available for digging. If he digs with the handle fully extended, a larger percent of the bail pull will be required to lift the dipper and handle than will be the case if he digs with a short stick. This is an obvious statement, since the dipper handle is a lever arm with the fulcrum at the shipper shaft or at the crowd or thrust pinions. The point is illustrated by two sketches, Fig. 6 and Fig. 7, where the dead weight of dipper, dipper

(Continued on Page 108)



FASTER, SURER PRIMING SPEEDS UP WORK!

On the job performance proves that DOUBLE PRIMING, exclusive with CMC speeds priming as much as six times. Yes, any CMC delivers full capacity far quicker than single priming pumps. Renewable Impellers and wear plates add years to their life. Sizes 1½" to 10" . . . a complete line.

New Special CMC Pump Catalog Now Ready.
Write for your copy!


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WATERLOO, IOWA



MIXERS • PUMPS • HOISTS
BATCHING & PLACING EQUIP.
SAWS • CARTS • BARROWS

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**EXTRA
VALUE**
in
SHOVELS!



**ASK
for the
ONLY
SHOVELS**
with
**Blade Edges
GUARANTEED
SPLIT-PROOF**

INGERSOLL SHOVELS
"The Borg-Warner Line"

Write for Catalog and Prices

**INGERSOLL STEEL & DISC DIVISION
BORG WARNER CORPORATION
NEW CASTLE, INDIANA**

Plants: New Castle, Ind.; Chicago, Ill.; Kalamazoo, Mich.



some wars are won *before they start*

Victory may take time. But its foundations were laid long ago by the kind of thinking that has made American fighters and workers respected the world over. When, 17 years ago, men had developed, tested and perfected Preformed Wire Rope they were only following the American tradition of trying to do the job better. Preformed did not seem an urgent necessity, judged by the standards of 1924. But today, under war pressure, Government and Industry are demanding all the Preformed they can get — and more and more of it. Because, now, most men in the heavy industries realize that Preformed Wire Rope wears longer, speeds work, reduces accidents, cuts costs. And by lasting longer, Preformed saved enough steel in one year, for example, to build a striking force of more than 500 tanks. Preformed Wire Rope was not planned for war. But it started years ago to help win it.

*Preformed wire rope
Conserves America's Steel*

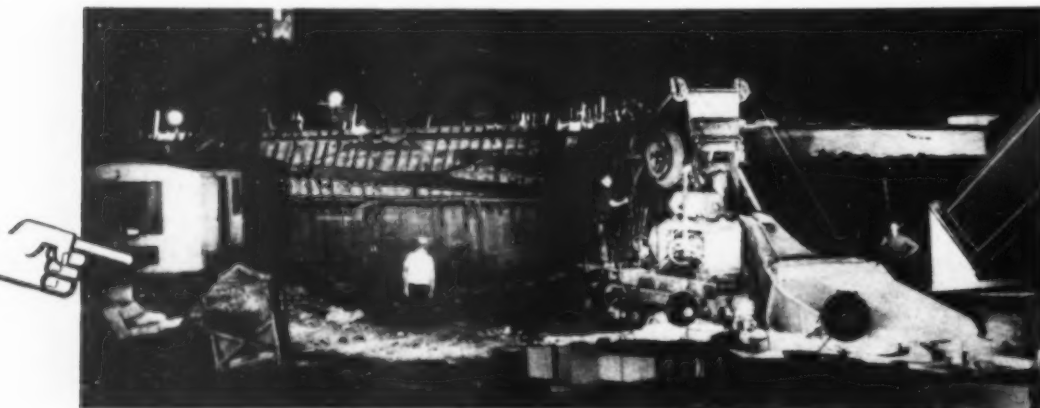
ASK YOUR OWN WIRE ROPE MANUFACTURER OR SUPPLIER

You Can Use Your Homelite Generators Right Around the Clock

Keep your Homelite Portable Generators busy. They'll work for you 24 hours a day. They'll help you build faster even if you're short of man-power. They'll cut down on delays, waste, and accidents.



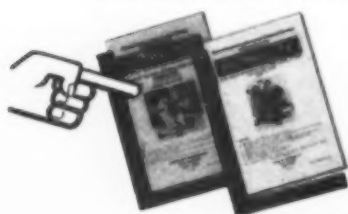
On the Day Shift—Use your Homelite Generators to operate electric hand tools. With a Homelite, you get electricity where you need it and when you need it. No delays. Set the unit up anywhere—start the built-in gasoline engine—and instantly, you have 1800 watts, enough to operate saws, drills, and many other time-saving electric tools.



On the Night Shift—Use your Homelite Generators for operating brilliant floodlighting as well as electric tools. Portable Homelite-operated floodlights help you keep operations going through the night. They give your men the illumination they need to work quickly, efficiently, and safely.

THE PUMPS WILL SAVE TIME, TOO

Keep your Homelite Pumps on the job also. They will handle seepage just as well as 15,000 gallons per hour. They will keep excavations drier. Your men will work faster. Delays will be eliminated.



SEND FOR THESE BOOKS

Our service manuals show how to keep Homelite Pumps and Generators in good condition. Send for copies. Specify model and serial numbers of your units.

HOMELITE CORPORATION

1808 RIVERDALE AVENUE, PORT CHESTER, N. Y.

(Continued from Page 106)

handle and dirt acts at the center of gravity as shown. Because less force is required for the second case, Fig. 7, and the bail pull remains the same, a greater force or greater digging effort is available when digging is done with as short a stick as possible.

Operating Example

To illustrate the application of this principle in actual digging, the relationship which exists in a large stripping shovel will be considered. This example is selected merely because exaggeration will bring out the operating points more clearly. The principle is the same for both large and small machines. Fig. 8 shows in outline the elements of a shovel and a bank. If the machine is moved close to the bank, it can take out cut B with a short dipper handle. This cut represents approximately 25 percent of the cross-sectional area shown, which is divided into three zones, A, B, and C. In order to take the second cut C and still dig with a short handle, the operator moves up the shovel to position 2 as shown, a distance of 8 ft. in the illustration. It is desirable to have the extra digging effort that is available when operating with the shorter stick because in the lower strata which cut C reaches more difficult material ordinarily is encountered.

After removal of cut C, the shovel must make cut A, which is the last and clean-up cut. Here the hardest material is usually encountered. Since cuts B and C have previously been removed, cut A will be dug more easily because there is now less weight on top of it. In order to have the most effective length of dipper handle, it may even be desirable in making this last cut to back up the shovel so that the point of the teeth will be at the spill of the cut when the dipper is dropped into the pit. If moving back is not required, there will be only one clean-up cut for two moves of the shovel. In addition, there will be the further advantage of a longer sweep of the dipper to produce a level floor before the dipper moves upward.

With this scheme of dividing the cut into three zones, there is also some gain for large shovels in the horizontal movement of material, but this advantage is not so important in the average small operation, where the loading is into trucks.

This relationship of digging position with length of dipper handle holds even to the $\frac{3}{4}$ -cu.yd. shovels, as Photographs 4 and 5 quite clearly show. Observe the difference in "digging angle," the angle between hoist rope and dipper handle, in these two illustrations, and note how much more favorable is the bail-pull direction with respect to the travel of the dipper teeth in Photograph 4 than it is in Photograph 5.

These several exhibits are presented to help analyze the shovel cycle and to show the operator graphically what occurs during a shovel cycle in order that

(Continued on Page 112)

Nation-wide

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ALABAMA		
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Ross, Young, Dilts Corp.	Trenton	
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TO HELP USERS of Adams construction equipment obtain maximum utility from their machines the Adams organization of 83 authorized dealers and factory branches in the continental United States brings competent service within quick, easy reach of every possible job location. For contractors taking "out-of-the-country" contracts service is available from the Adams factory and dealer organization in Canada, dealers in all U. S. possessions and in 31 foreign countries. Take full advantage of this widespread, efficient organization for service needs wherever you are. . . . Check the list for your nearest Adams dealer!

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Plains Machinery Company	Plainview
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UTAH

The Lang Company	Salt Lake City
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Municipal Sales Company	Richmond
Roanoke Tractor & Equipment Corp.	Roanoke

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Howard-Cooper Corporation	Seattle
Howard-Cooper Corporation	Walla Walla
Glenn Carrington & Co.	Seattle
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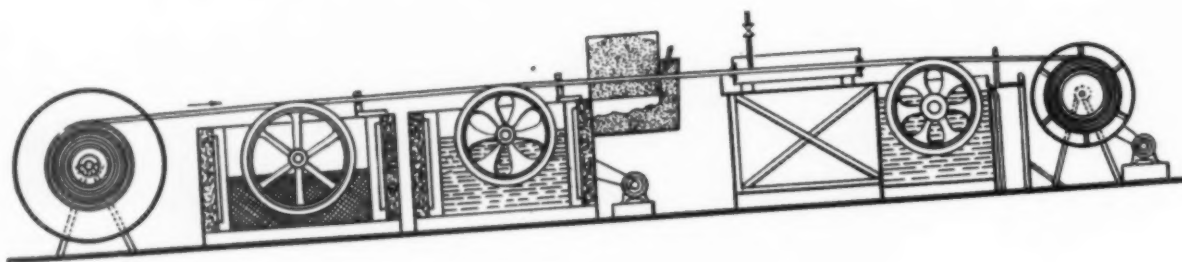
TO KEEP YOUR EQUIPMENT ROLLING . . .
service and overhaul it regularly. See your nearest Adams dealer for new machines available under priority rating and for repairs and service on your present equipment . . . Wherever you are or wherever you go Adams co-operative service is near at hand.

ADAMS

ROAD-BUILDING AND EARTH-MOVING EQUIPMENT

WAR

is engineered scrap →



This war machine was built from an old pulley, the rear wheels of a truck and odds and ends of sheet steel.

It will never fire a projectile nor drop a bomb. But if our enemies really understood America it would frighten them.

The function of this scrappy gadget is to renew the weather-proofing on electric power wire . . . wire that would otherwise have to be junked.

► But war teaches us to look beyond machines to the hearts and minds of the men who make them.

In such perspective the device shown above takes on deep significance. It becomes a mechanical parable on the ingenuity of men whose job it is to keep electric power flowing to the vital war industries, regardless of shortages of copper, steel, rubber, aluminum.

► There are hundreds of such parables in every war-converted industry. Here are just a few from our great electric power plants:

. . . tons of bolts are being saved by a new method of rigging crossarms on electric poles.

. . . a southern generating station found its dam weakening. To keep the power flowing, holes were bored through the concrete and the dam bolted to bedrock!

. . . to avoid a shutdown, a middle-Atlantic utility worked out a method of stopping leaks around the giant valves controlling its water supply by mixing sawdust with the water. It worked.

. . . a western company bought old suspension cables from the wrecked Tacoma Bridge, untwisted them and used the metal as concrete reinforcement.

So goes the saga of electric power, as the industry does its share in the common task . . . With much of its trained man-power in the services, with priorities available only in the most urgent cases, the American utilities are showing the stuff American management and labor are made of.

But where are the stories of plants rushed into being almost overnight to supply electric energy?

As an American, you can thank your lucky stars such stories are few. Generating plants and power lines take years to build. For instance, our country's power equipment at the start of the war represented an investment of more than the present combined cost of the two-ocean navy and lend-lease expenditures.

War conversion for this vigorous industry was almost as simple as pushing the light switch on your reading lamp. The power was there because energetic managements had created it in the normal course of American life.

Some rush construction was necessary, but the electric power industry was first in war because it had been first in peace.

► The story goes back to the depression years. The utilities were the first to shake off the doldrums. By 1935, they had already passed 1929 levels.

. . . By the time the war broke out in Europe, America's giant electrical capacity surpassed that of any combination of potential enemies.

. . . It has grown since then, with 3½ million kw. capacity scheduled to be added in 1942. This year, the industry also will spend 150 million dollars on maintenance alone.

► Because of these private expenditures, because the electrical companies started years ago to sell women on the convenience of electrical home appliances . . . and because the industry has always built in advance of demand, it was ready for either peace or war, with the world's greatest system of power production and distribution.

★ ★ ★

In recognition of the miracle of war production—accomplished through the cooperation of American management and labor with the W. P. B. . . . this advertisement is published by the McGraw-Hill Network of Industrial Communication.

McGRAW-HILL PUBLISHING COMPANY, Inc.
330 WEST 42nd STREET NEW YORK



WITH A POSTSCRIPT FOR BUSINESS EXECUTIVES

PERHAPS you saw the advertisement on the opposite page, in the newspapers.

Did you notice those five examples of the way in which maintenance men are meeting the problem of war operation?

That's what this page is about.

If one public utility maintenance man works out a new way of reconditioning wire, his idea becomes really valuable to the country when all maintenance men with a similar problem find out how he did it.

If one man experiments with silver and bismuth as a substitute for tin solder, that becomes great news for a man who needs tin solder and can't get it.

That's why industry after industry has been able to meet the war production challenge . . . by swapping ideas.

► In industry, this idea swapping is done mostly through the editorial and advertising pages of the industrial press.

McGraw-Hill, for instance, keeps 153 editors and 725 engineer-correspondents busy digging up new methods of doing things.

Industrial advertisers, too, often send men

into the field to discover new ways of making their products do more work, or last longer.

When such practical editorial and advertising information is distributed to the readers of the 23 McGraw-Hill publications, the value of each idea is multiplied by thousands.

So valuable is this interchange of technical information that many companies are surveying their organizations to make sure that the supply of Industrial Magazines is adequate.

► If you would like suggestions as to how to conduct such a survey, just write to Reading Counselor Department, McGraw-Hill Publishing Company, Inc., 330 West 42nd Street, New York.

★ ★ ★

THE MCGRAW-HILL NETWORK

More than 1,000,000 of the executives, designers and production men, who give America her world supremacy in technical "know-how", use the editorial and advertising content of the 23 McGraw-Hill publications as a means of exchanging ideas.

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Technical, engineering and business books for colleges, schools, and for business and industrial use.

MCGRAW-HILL PUBLISHING COMPANY, INC.

330 WEST 42nd STREET • NEW YORK

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Bus Transportation	Electrical Contracting	E. & M. J. Metal and Mineral Markets	Product Engineering
Business Week	Electrical Merchandising	Engineering News-Record	Textile World
Chemical & Metallurgical	Electrical West	Factory Management & Maintenance	Transit Journal
Engineering	Electrical World	Food Industries	Wholesaler's Salesman



When the "GOING is TOUGH" and the "LOAD is HEAVY"

— movers of heavy equipment have learned to rely upon

ROGERS BROTHERS CORP.
220 Orchard St., Albion, Pa.



TEN REASONS WHY THE BUTLER AGRACEMENT BATCHER WILL DO IT BETTER

Entire scale system is simpler, more rugged, and trouble-free. There are no cast iron parts to break.

Raised graduations on scale beams permit easy reading.

Self-locking poises seat themselves accurately, require no thumbscrews.

No clumsy shot cups to balance beams; poise type weights are used.

Tell-tale dial mounted on scale beam indicates balance plainly, will not bind like stationary type.

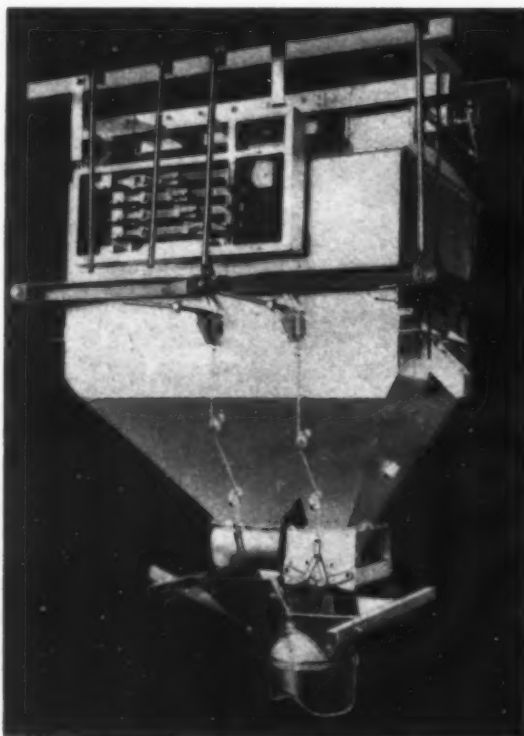
Compact beam box is handier, keeps cleaner.

Two compartment hopper is all-welded of heavy plate, has steep, obstructionless slopes.

Exclusive Twist-of-the-Wrist discharge is faster and simpler to operate than any other type; permits close grouping of all operating levers.

Clamshell gates have no racks or gears, cannot jam.

Entire batcher is compact, rugged, and efficient, occupying less room and providing greater convenience of operation.



BUTLER BIN COMPANY • Waukesha, Wis.

(Continued from Page 108)

he may improve his technique and obtain a greater output with less effort and with less wear of the machine.

Maintenance and Repairs

Under present circumstances it is of prime importance that any excavator in service be kept in condition to produce its rated capacity. The various expediences which have been used on various construction jobs to increase output by overloading a machine or by exceeding its established range, as well as attempts to dig in poorly prepared material, will now quickly result in diminishing returns because of conditions surrounding the obtaining of certain maintenance and repair parts.

In addition to applying the machine properly to obtain its maximum output, it must also be maintained in as high a state of operating efficiency as is possible. To maintain this condition, simple, careful, regular inspections of the machine will help and will permit anticipating the requirements for replacements and reconditioning. As in many cases the original supplier may be unable to furnish the usual part, if it involves critical materials such as alloy steels and alloys of copper, tin, etc., these inspections will permit the planning for, and the procurement of, temporary substitute parts. The use of such parts again brings out the need of careful use of the machine on the principle of saving what you have against the theory used by some in the past, never a sound theory, of getting the absolute utmost out of a machine and, upon completion of a particular job, "trading it in for a new one."

For maintenance of mechanical parts, the following are listed in the order of their importance:

1. Proper lubrication.
2. Proper adjustments.
3. Proper handling of the machine.
4. Making repairs promptly — even though of a temporary nature.

For electrical parts, maintenance will be enhanced by:

1. Regular inspection.
2. Keeping the parts clean, especially through exercise of care in the following particulars:

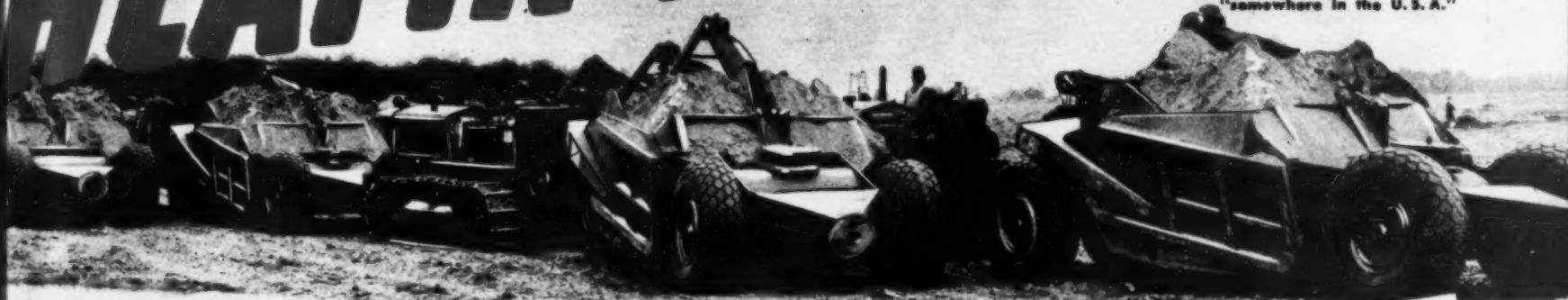
- (a) Avoid dirt and moisture and collection of material of a conductive nature.
- (b) Avoid collection of abrasive material.
- (c) Avoid the accumulation of excessive grease. An operator may carefully and properly replace brushes and still permit an accumulation of dirt which may lead to serious difficulty.

The technical and general press today carries numerous advertisements giving special instructions on maintenance of such items as wire rope, engines and

(Continued on Page 114)

HEIL SCOOPS give you HEAPIN' BIG LOADS—

4 Heil C16 Scoops, tractorized by FD Cle-tracs, hurrying an airport to completion "somewhere in the U. S. A."



**...That pay Extra Dividends
in Increased Yardage —
Every Day on Every Haul**

No matter how big the job, or how tough the operating conditions—Heil's traditionally famous "built to take it" construction will see your job through "on schedule", without costly delays or service expense.

Experienced operators continue to be amazed at the way Heil Road Machinery establishes record after record in daily yardage — regardless of soil conditions.

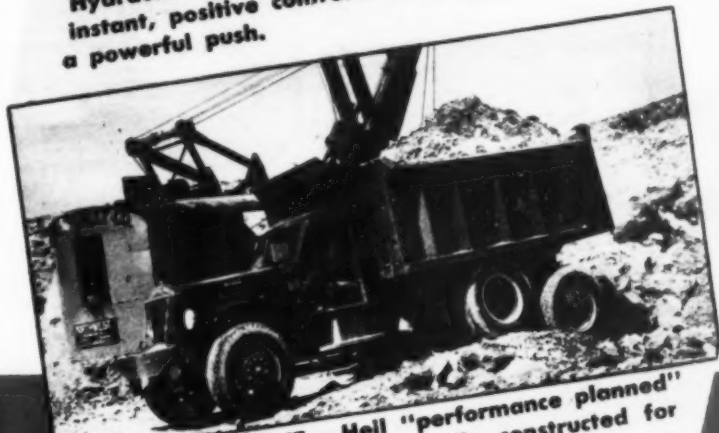
Whatever your Road Machinery needs, The Heil Co. has a complete line of ruggedly constructed equipment designed to do the job dependably, quickly and economically—equipment that pays you extra dividends in increased production and decreased maintenance costs.



TURNS ON A DIME—Heil Hi-Speed Tractor-Scoop Combination turns and maneuvers effortlessly, and gives you faster, more profitable operation.



ROUGH AND TOUGH, or gentle as a lamb — Heil Hydraulic Trailbuilders and Bulldozers give you instant, positive control — for a gentle nudge or a powerful push.



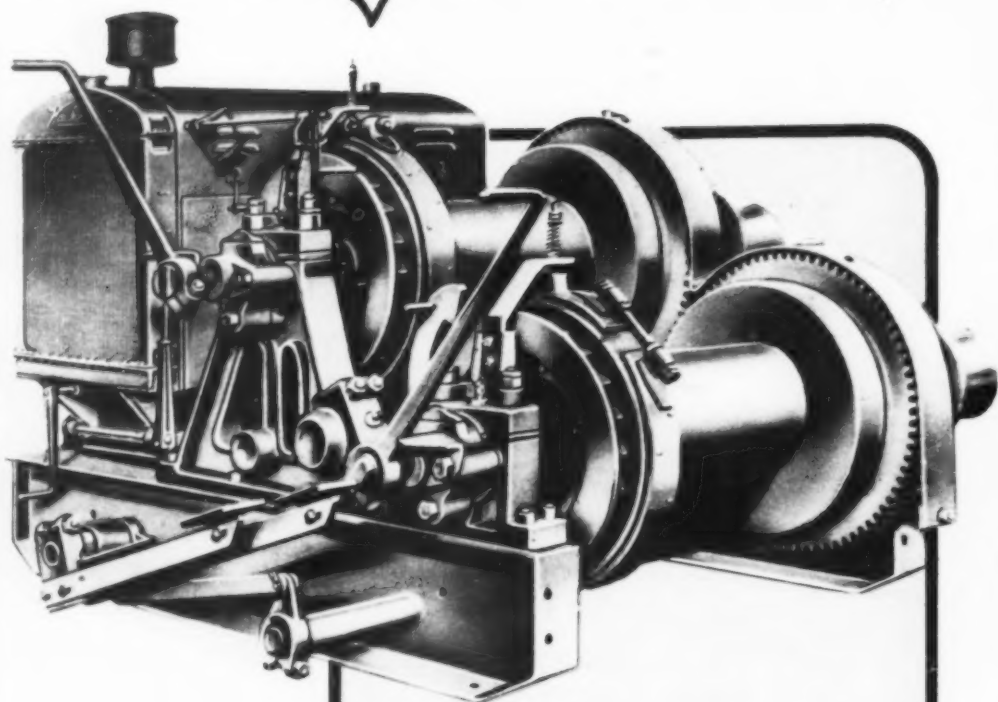
BUILT TO TAKE IT — Heil "performance planned" bodies and hoists are ruggedly constructed for dependable, positive, long-life performance.



THE HEIL CO.

GENERAL OFFICES MILWAUKEE WISCONSIN

CLYDES *give better service*



If you are fortunate enough to own a Clyde hoist, you know it is a husky machine built to give many years of top-notch performance. During these critical times extra care should be given it to help increase its efficiency and prolong its life.

Proper lubrication is very important to the life of any machine. A few minutes a day will reduce wear through friction and add years of service. If you do not have a lubrication bulletin that shows the proper lubricants and how to apply them, we will gladly send one.

Careful periodic adjustments of frictions, brakes and all wearing parts will also do much to give more efficient and satisfactory performance. Keep all bolts tight. Note parts subject to wear and replace, if necessary. Proper care of your hoist will keep it running.



CLYDE IRON WORKS, Inc.

DULUTH, MINN.

(Continued from Page 112)

motors. An operator can hardly escape being exposed to this advice, but it is of the greatest importance that every operator familiarize himself with his particular machine and follow the special instructions on care, maintenance, and operation which the manufacturer has prepared for the machine, including all its parts.

★ ★ ★

Wood-Frame Warehouses

Save Both Time and Steel

(Continued from Page 50)

of wire mesh amounting to 59 tons, and reinforcing bars for the column foundations and grade beams of the buildings total 11 tons. This steel consumption is light in comparison with the amount required for a reinforced-concrete warehouse of the type constructed at the supply terminal; the steel shells for the cast-in-place piles under one of the concrete buildings amount alone to 101 tons.

Volume of concrete in the foundation slab of a wood-frame warehouse is about 4,800 cu.yd., some 1,300 cu.yd. less than the concrete in the superstructure and floor of an equivalent concrete-and-brick warehouse on pile foundations. The timber frame requires about 350,000 ft. bm. of lumber, while the roof and sidewalls take 120,000 sq.ft. of 2-in. gypsum plank and nearly 37,000 sq.ft. of corrugated asbestos-cement siding. Steel items involved in the frame construction include 341 pieces for anchor straps at the bases of the columns, 1,264 lag bolts and 960 purlin clips.

Foundation Slab

Floor slab in the wood-frame warehouses is 12 in. thick and is reinforced with two layers of 6x6-in. No. 6 wire mesh. One layer is placed 2 in. above the bottom of the slab, and the other is installed 2 in. below the top. At column locations, reinforcing bars for the pedestals are embedded in the slab when the concrete is placed. Under a grade beam 1 ft. 8 in. high, placed monolithically with the slab around the four sides of the building, the thickness of the mat increases to 18 in. The slab extends 5 ft. beyond the sides of the building; this apron is 12 in. thick, with its outer edge 6 in. below the grade of the floor inside the building to meet the grade of the surrounding pavement.

Truck-mixers charged at a central batching plant deliver 4-yd. concrete batches to the point of placement in the slab. Wire mesh is unrolled in advance of concrete

(Continued on Page 116)



Feeding War Dogs

ANOTHER JOB FOR WICKWIRE ROPE

We'll be glad when it's over . . . when Wickwire rope can get back to the jobs of a world at peace.

The quickest way from here to there is for us, and for you, each day *now*, to put everything we have into winning.

We are doing it by working day and night, seven days a week, on Wickwire Rope for our shipyards, our Liberty Fleet, the army, marine corps, coast guard and navy . . . and for industries whose production is so urgently needed.

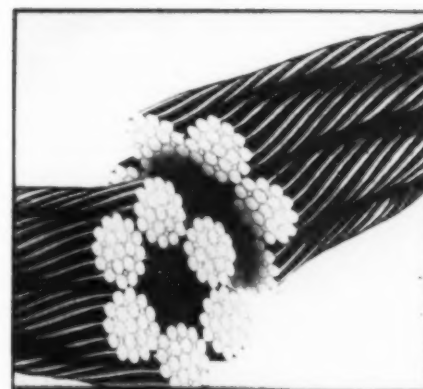
You are contributing when you take care of your wire rope, making it last longer . . . so that there is more available for war needs.

But when you *must* have new wire rope,

for war production or for essential services, ask your distributor for long-life *Wickwire* Rope. Both Wickwire regular lay and pre-formed Wissco Lay have quality that has made them famous for *low cost per year of use*. We put that into Wickwire rope by controlling every step from ore pile, through blast furnaces, open hearths, precision wire drawing, and skillful laying of the rope.

. . .

A FREE BOOK, "Know Your Ropes," is waiting here for you. More than 25,000 wire rope users all over the world consider this a bible on the selection of wire rope—and *making it last longer*. Write Wickwire Spencer Steel Company, 500 Fifth Ave., New York, N. Y.



REVERSE ROPE FOR LONGER LIFE
Frequently, most severe strain, due to close bending, occurs near one of the ends. Rope life is increased by exchanging the drum end with the load end. This and forty more rope life-savers are fully described in the free book, "Know Your Ropes."

SEND YOUR WIRE ROPE QUESTIONS TO WICKWIRE SPENCER




WICKWIRE ROPE

Sales Offices and Warehouses: Worcester, New York, Chicago, Buffalo, San Francisco, Los Angeles, Tulsa, Chattanooga, Houston, Abilene, Texas, Seattle. Export Sales Department: New York City



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Cut Costs*



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SLEEVE
TYPE
PATENT
BASE**

*"Turn the
BASE
Not the
HAMMER"*

Standard Model Union Pile Hammers can be fitted with our patent sleeve-type base, which can be ordered with sections for driving steel sheeting, concrete piles or pipe. This base rotates—you don't waste time lining up the hammer! Also absorbs shocks that usually go to hammer frame. Patent round base for driving round wood piles. This is just *one* example of how Union—"the hammers with the WALLOP"—cut costs, speed work. A complete line—all sizes—for steam or compressed air, without change of parts.

★ SPEED CONSTRUCTION WITH ALL UNION PRODUCTS

If you've got to RUSH WORK on an airplane or munitions plant, a road or terminal job, a tunnel or ANY win-the-war-job—use UNION equipment for SPEED!

Buckets—all kinds	Mine & Shaft Cages
Cableway Skips	Tunnel Shields
Concrete Placers	Hoists
Grout Mixers, Ejectors	Special Equipment

Get

Bulletins on Union Equipment. See how well we design with over 40 years experience behind us.

UNION IRON WORKS, INC.

Engineers and Manufacturers
Spofford & Lidgerwood Aves., Elizabeth, N. J.

(Continued from Page 114)

placement, as indicated by several of the accompanying photographs. Workmen screed and float the slab by hand to a true, even surface. A typical slab unit takes 800 cu.yd. of concrete, which ordinarily is placed in less than 8 hr. by about eight truck mixers.

Mill-Type Frame

Lumber used for the warehouse framing is No. 1 common fir. Timber columns are spaced 20 ft., c. to c., in both directions. Concrete pedestals 20 in. high and 20 in. square support the interior columns, while exterior columns rest on similar pedestals formed monolithically with the grade beams. The interior columns are 10x10-in. timbers, while 8x10-in. and 8x8-in. sticks are used for the exterior posts. To accommodate a roof pitch of $\frac{1}{4}$ in. per ft. from the longitudinal center line to the two sides of the building, the column timbers vary in length from 17 ft. 5 in. to 15 ft. 4 in.

Bolsters just $\frac{1}{2}$ in. short of 2 ft. in length carry the girders on top of the posts. The bolsters are 8x10-in. timbers on the interior columns and 8x8-in. on the exterior columns. Girders, lined up on the columns in the longitudinal direction of the building, are 10x16-in. timbers (8x16-in. on the exterior columns) which carry 6x12-in. purlins at 6-ft. 8-in. spacing. Every third purlin is centered over a transverse line of columns.

Two 8-in. concrete block firewalls separate the building into units. Where a firewall divides the building, roof framing on both sides is supported at a short distance from the wall by 6x10-in. columns.

Bracing of the mill-type frame is ample for necessary rigidity and safe resistance to wind loads. Spiked diagonal braces connect columns to roof frame members at all locations. Each of the exterior columns, including the 6x10-in. columns next to firewalls, is braced three ways to overhead members. Four-way bracing is applied to all columns in the interior. The braces are 3x8-in. pieces, 6 ft. 6 in. long to the girders and 9 ft. 9 in. long to the purlins.

Roof and Walls

Long-span U.S. Gypsum panels 2 in. thick, bound with metal t.&g. edges which mesh to form a continuous deck for load distribution, are nailed directly to the purlins. The deck is later covered with built-up roofing mopped on the gypsum plank.

Sidewalls are almost completely inclosed with 3 $\frac{1}{2}$ x10-ft. corrugated Transite sheets applied in two courses and attached by 4-in. drive screws to the girts between columns. Six overhead wooden doors opening to 15-ft. 2-in. clearance for loaded trucks are installed in each of the long sides of the building. The only windows are in a small section, about 70 ft. long, for office, locker, toilet and heater rooms located along one sidewall of the building in the central area. Two pass doors open into this office section, and the three main storage areas are served by six pass doors, three

(Continued on Page 118)

STRIP PAINT

this faster, easier way!

Are you up against the problem of stripping paint or removing caked-on oil, grease and muck from construction and road building equipment before repainting and reconditioning? Then try doing this work the faster, easier, low-cost Oakite way by applying recommended Oakite stripping or cleaning solution with the Oakite Steam Gun. You will find deposits are thoroughly, speedily removed from such equipment as:

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COFFING HOISTING AND PULLING EQUIPMENT *Speeds* MAINTENANCE

Contractors, constructors and manufacturers are now thrown back on used equipment resources. Used equipment means a lot of maintenance work. The Coffing "Safety-Pull" ratchet lever hoist is a handyman for all kinds of maintenance jobs. Hundreds, yes, thousands of men who are out on the job tell us that their "Safety-Pull" hoists have no equal wherever a lift or pull is needed. They are light in weight—they are powerful—they are safe.



**WRITE TODAY FOR CATALOG DG6
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DANVILLE, ILLINOIS**



“Why should I? I’m a truck with a *Cummins Diesel*—one of ten used by the Hinman Bros. Construction Company of Pittsburgh and Denver on the Letterkenny Ordnance Depot and Arlington Housing grading jobs. Altogether, we’ve gone 100,000 hours without an overhaul since we changed to a certain oil that eliminates sludge trouble. We keep going and feel fine because we lead *clean* lives!”



“Naw—tough going’s easy for me. I’m a power shovel with a *Waukesha-Hesselman Diesel*. Hinman operates two of us on this same job, and we total 20,000 hours without an overhaul. Know why we don’t bog down? Because we use the same oil—and it stops *ring-sticking* cold. It keeps us going strong!”



“Rest? For what? This heat doesn’t bother me. I’m one of the 22 pieces of Hinman Bros. equipment with *Caterpillar Diesels*. All told we’ve gone 220,000 hours without an overhaul. Sure it’s hot, but we use that oil too—and it sure *sticks to the hot spots*, so we get along swell!”

STANDARD OIL COMPANY OF CALIFORNIA



and if YOU want to keep going, old fellow, do as we do . . . use RPM DELO!



RPM DELO is marketed under the following names:

RPM DELO • Caltex RPM DELO • Kyso RPM DELO
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In this new edition you will find latest surveying practice carefully defined; new developments in highway and railroad work thoroughly covered; specialized recent data on design and construction of framed structures; new specifications for concrete and steel design to conform to latest approved specifications; important new data on foundations, sewerage and water supply.



Here in one handy volume is the practical, up-to-date information you need on:—

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(Continued from Page 116)

on each side of the building. End walls are unbroken by doors or windows.

Window sash and all doors are of wood. Metal flashing and edge strips have been eliminated in the design of the building, mastic flashing and edging being used instead. Wooden ventilators, specially designed by the contractors, are fabricated in a mill on the job. For fire protection, the warehouses have dry pipe sprinkler systems which eliminate need for heating the buildings.

Direction

Construction operations by the contractors at the naval supply terminal is for the Bureau of Yards and Docks of the Navy Department, which supervises all the work. Rear Adm. Ben Moreell (CEC) U.S.N. is chief of the Bureau of Yards and Docks. Operations on the project were under the direction of Comdr. A. D. Alexis until he was transferred during the spring to another station. Lt. Comdr. E. A. Verpillot is now officer in charge of construction.

Wood-frame mill-type warehouses described in these notes were designed and are being erected by the contractors, for whom G. W. Bailey is project manager. The contract is held jointly by two firms, the Wigton-Abbott Corp. and the Mahony-Troast Construction Co.

★ ★ ★

Screening Rig

Provides

Cobble Blankets

for Earth Dam Slopes

(Continued from Page 39)

vious fill or the gravel and cobble blanket.

To avoid the cost of such a screening plant an ordinary tractor-hauled elevating grader was equipped with a vibrating screen extending outward from the end of the boom of the grader to receive the discharge of the belt. This rig, moving along the top of the embankment as it was built up, separated cobbles and gravel from the sandy material, discharging the former on the face of the slope and the latter just inside the slope line, as shown in one of the accompanying photographs. As a preliminary to the use of the mobile screening outfit, it is necessary to blade the material to be processed into windrows from which it can readily be loaded by the elevating grader. By raising and lowering the grader boom some latitude is possible in working through the width of the windrow of material being processed, while still maintaining the proper position of

(Continued on Page 120)



BAKER Hydraulic Bulldozers

TREE DOZING, stump pulling, dirt moving, filling ravines, building ramps, mowing down glacial ridges—Bakers, the utility earth movers, by the dozen, are doing these things and a lot of others that are not in the blueprints all up and down

CENSORED!

Contractors who have used Bakers for years and have had an opportunity to compare all types of earth moving equipment, still praise the Baker's utility.

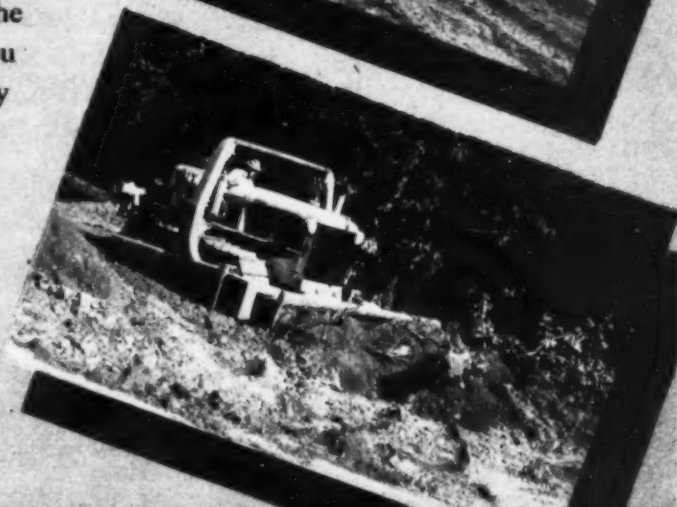
And much of its plus utility results from the fast, direct, positive hydraulic control. You can *jiggle the blade* to roll a log as shown above. Or bring the moldboard into play to *shove a dirt lugger*. And you can *hook a Baker Hydraulic Scraper on your tractor back end* with a Baker Bulldozer on the front end. And if you need a *winch on the back end*, you can have that, too, and still have the utility you get only from a Baker Hydraulic Bulldozer or Gradebuilder.

Let us send a copy of "Unsung Heroes" which gives a picture account of what Bakers, like these, are doing to win the war.

THE BAKER MFG. CO.

568 Stanford Avenue

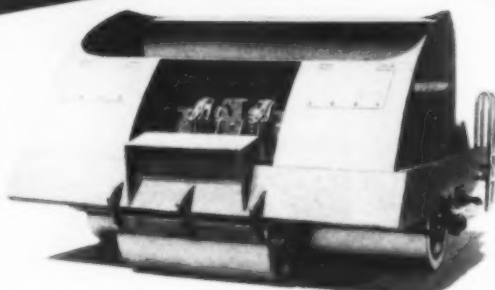
Springfield, Ill.



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The Modern Tractor Equipment Line
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EARTH MOVING
LEVELING AND GRADE BUILDING
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catch up on
Aggressor Nations



The SPREADEROLLER

- segregates chips —
- It spreads 3 sizes —
- It rolls firm and smooth —
- It does the job faster —

Totalitarianism has a head start on us, but we can easily catch up with help from time-saving, cost-cutting equipment like the Universal "Chip-Top" Spreaderoller.

The Spreaderoller applies a seal coat on bituminous treated mat base, segregating chips, spreading them in 3 layers—largest first, then medium and fines on top—and rolls them firm and smooth in a single operation at speeds up to a mile an hour.

The result is a tightly interlocked, water-repellent, anti-skid, "white top" surface ideal for airport runways, aprons and hangar floors, as well as for defense roads and thoroughfares.

Takes the place of both spreaders and rollers on maintenance, too! Time is short—get the facts today!

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CRUSHERS, PULVERIZERS, COMPLETE PLANTS, SPREADERROLLERS, PORTABLE ASPHALT PLANTS

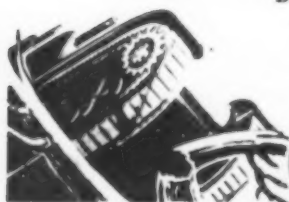
Tough as the HIDE of a HELL-BUGGY!



—and there's a reason, for Owen Heavy Duty Excavating Buckets like modern war tanks, are designed and built for tough assignments and are always dependable under the most difficult operating conditions. Quality materials used in construction throughout, assure long service life with a minimum of wear.

THE OWEN BUCKET COMPANY
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OWEN BUCKETS



(Continued from Page 118)

the boom for discharging gravel and cobbles directly on the slope of the dam.

Work on John Martin Dam involves placing of 5,500,000 cu.yd. of rolled fill and 570,000 cu.yd. of concrete by Caddoa Constructors, an organization comprising W. E. Callahan Construction Co., Gunther & Shirley Co., and Rohl-Connolly Co.

★ ★ ★

Traffic Divider

Provides

Built-In Safety on

4-Lane Parkway

(Continued from Page 46)

pavement center line, to mark the sides of the 24½-in. strip to be cut out. This operation was done by a special rig, illustrated in one of the pictures, consisting of a low platform on wheels pushed by the pneumatic-tired tractor element of a light-duty pavement breaker from which the air hammer had been removed from the steel boom on the front end. This outfit is driven by an air motor and its travel speed is geared down to ¼ mi. per hr.

The wheel-mounted platform pushed by the tractor is a steel framework equipped on each side with adjustable slotted bars, set accurately to the required width of the cut. Through these slotted bars pass the points of chisels on two Thor pneumatic hammers, one on each side of the center line, which score the concrete pavement in parallel lines ¾ in. deep as the outfit moves forward. The accuracy of the alignment of the scoring cuts is insured by a steel disk, mounted under the framework of the machine, which travels in the bituminous-filled longitudinal joint between the inner paving slabs, thus centering the equipment during its travel both on straightaway and curved sections of the roadway. With this equipment the margin of error in the alignment of the scored lines was maintained below ¼ in. The pneumatic hammers that score the pavement are served by a hose line from a Schramm compressor mounted on a truck which moves along ahead of the scoring machine. With this outfit it was possible to score 10,000 lin. ft. of double line, ¾ in. deep, in an 8-hr. day.

After the parallel scoring lines have been cut in the pavement to mark the edges of the 24½-in. trench, a truck-mounted mechanical pavement breaker with a reciprocating pneumatic hammer, standard equipment of the Concrete Cutting Corp., makes two passes along the center line, smashing the concrete in the trench, on the first pass, to within 4 in. of the scored lines on the edges. This operation, No. 2, is followed by a trimming

crew of six men equipped with pneumatic hammers to cut the sides of the trench to final width, constituting operation No. 3. On the first pass the mechanical pavement breaker is equipped with a hammer head 4 in. in diameter which makes the initial break in the concrete and allows the broken pieces to be removed above the level of the mesh reinforcement, which is then bent back clear of the trench. On the second pass, after the larger pieces of broken concrete are removed from the trench, a steel point on the ram of the breaker pulverizes the broken concrete to sizes that can readily be removed from the cut by hand shovels, completing operation No. 4.

With a crew consisting of 2 men on the pavement breaker, 3 men on the scoring or line-cutting machine, 1 compressor man on the truck supplying the line cutter, and 6 drillers trimming the sides of the cut, it was possible to break out 1,200 lin.ft. of trench in an 8-hr. day.

Setting Forms

The second stage in the construction program covered the setting of forms for the longitudinal concrete barrier. Because of the scarcity of steel for all types of non-military construction, Contractor Harris Grand designed and fabricated forms of wood in 8-ft. lengths, as illustrated. They are made of 1 in. lumber built up to form the combination of sloping and curved surfaces called for by the cross-section of the divider and stiffened on the outside by transverse ribs. Two form units, one on either side of the trench in the pavement are set for each 8-ft. length of traffic divider, leaving an opening 5½-in. wide at the top for the pouring of concrete. The forms are held in place by wiring them to the exposed wire mesh reinforcement of the existing paving slabs, after the mesh has been bent to an angle of 45 deg. to extend into the poured concrete forming the base of the divider. To prevent spreading as they are filled with concrete, the forms are wired across their bottoms and clamps of ½-in. steel bar reinforcement, bent into the form of a channel, are placed over the tops, which are held apart to the proper 5½-in. opening by wood separators. In addition, the forms are weighted down by sandbags, three on each side for an 8-ft. section of divider.

Pouring Concrete from Truck-Mixer

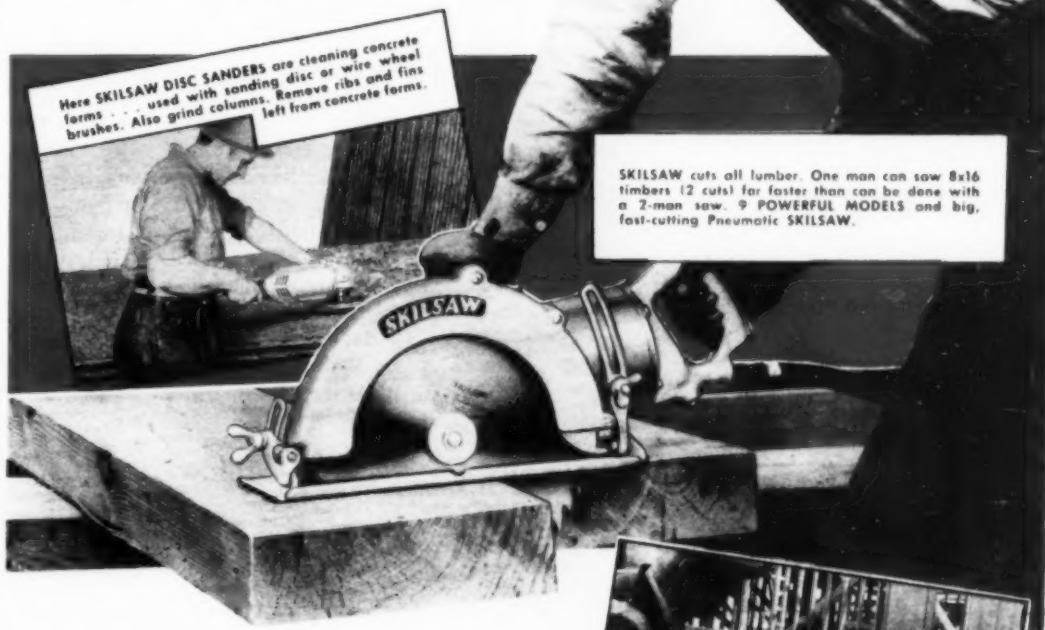
Delivered to the job in 5½-cu.yd. Jaeger truck-mixers from the Brooklyn plant of the M. F. Hickey Co., concrete with stone aggregate mixed in proportions of 1: 2: 3½, is chuted into the forms through the 5½-in. open slot in their tops. The curve forming the top of the divider is screeded to shape. Forms are set for pouring a 500-ft. length of traffic divider and are stripped two or three hours after a pour is completed. After stripping, the 8-ft. long form units are cleaned, loaded by hand on a flat-bed truck and moved ahead on the job, for re-setting. The surface of the concrete divider is then brought to a

(Continued on Page 122)

EVERY MAN COUNTS FOR MORE

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SKILSAW TOOLS SPEED WAR CONSTRUCTION!



Here SKILSAW DISC SANDERS are cleaning concrete forms . . . used with tanding disc or wire wheel brushes. Also grind columns. Remove ribs and fins left from concrete forms.

SKILSAW cuts all lumber. One man can saw 8x16 timbers (2 cuts) far faster than can be done with a 2-man saw. 9 POWERFUL MODELS and big, fast-cutting Pneumatic SKILSAW.

KNOW why 9 out of every 10 War Contractors use SKILSAW TOOLS? The answer's simple—these husky, easy-handling tools rush arsenals, cantonments and War Plants to completion *faster!* They do more jobs . . . and save more time on every separate operation.

SKILSAW TOOLS are lighter, more compact, yet far more powerful. Ask your distributor for a demonstration on your own jobs and you'll understand why contractors everywhere say that SKILSAW TOOLS make every man and every minute count for more!

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SKILSAW PORTABLE ELECTRIC TOOLS

★ MAKE AMERICA'S HANDS MORE PRODUCTIVE ★



SKILSAW DRILL speeding up deep wood boring in super-structure timbers. Also used for drilling Masonite and other composition boards.

SKILSAW SPEED BITS will solve your wood-boring problems. Especially designed to eliminate binding by faster chip clearance. Out-perform to 3 in. diameters.

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PATENTED

A combination Tie and Spreader used on National Defense Projects from Coast to Coast.



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PROVIDES A 3000 lb. WORKING LOAD
ASSURES ACCURATE WALL WIDTHS
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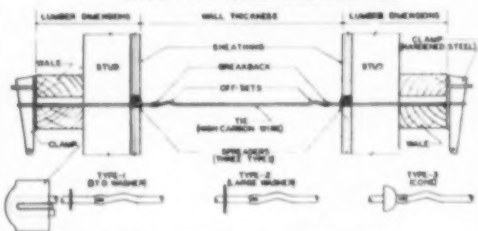
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(Continued from Page 121)

smooth finish by wood hand floats. Curing of the concrete is done by a spray coat of Ritecure, a colorless curing compound. During construction of the divider, traffic was maintained on the two outer lanes of the parkway where work was in progress, the inner lanes being needed for the contractor's operations.

The construction of the traffic divider reduced by 1 ft. the paved roadway width on each side of it, leaving 21 ft. for each pair of traffic lanes. To compensate for this reduction in pavement width, a broken white lane marker, as shown in one of the illustrations, was painted to provide an inner traffic lane of 10 ft. 10 in. and an outer lane of 10 ft. 2 in.

Personnel

For New York City's Department of Parks, of which Robert Moses is commissioner and George E. Spargo, executive officer, the installation of the 9-mile long traffic divider on Grand Central and Interborough Parkways, was supervised by John A. Mulcahy, resident engineer, and H. D. Bender, engineering inspector. Designs for the project were prepared under the direction of James A. Dawson, director of engineering. Harris Grand, contractor, of Brooklyn, supervised the work of his own field forces, aided by Sebastian Ribeiro, as general superintendent. Concrete-breaking operations, under a subcontract with the Concrete Cutting Corp., of Brooklyn, were in charge of W. V. Cornett.



New Shipbuilding Technique

Produces

Steel Cargo Vessels

In 46 Days

(Continued from Page 59)

gether. The after-deckhouse is partially assembled, to a weight of approximately 20 tons, which is placed on the ship by two cranes. This deckhouse preassembly plan could be carried much farther, and in a nearby yard, under the same general management, designs have been prepared for a deckhouse assembly program involving 200-ton lifts.

Many of the key men in the Oregon Shipbuilding Corp. organization were recruited from the construction industry and came to the job uninhibited by shipbuild-



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ing precedent. They have introduced many short-cuts and methods of material handling not heretofore standard in ship construction.

For example, an expeditor follows each order for material from the time it goes to the U. S. Maritime Commission until the material arrives on the job. A control department watches and records progress of the material through the plate and assembly shops and to the ways. Each way superintendent indicates in advance what material he must have and what equipment he needs to handle it. The control department checks these needs, and materials and assembled parts are requisitioned in such a way as to avoid risk of delay on any of the ways. Under this system there is a constant check on the coordination of work in each part of the yard.

Working Conditions

Employing 30,000 persons, this yard works three 8-hr. shifts every day. Each worker gets one day off each week on a rotating schedule. Whenever that day off falls on a Saturday, he also gets the following day, thus having a 2-day weekend every seven weeks. This rotation of hours is arranged to avoid interference with crew operation by staggering the day-off allocations for key men. For example, each employee assigned the letter "A" begins with Monday as his day off in the first week, Tuesday the second week, and so on. The "B" employees start with Tuesdays off, and so on. An understudy, coached in advance, takes over the foreman's job one day a week and the shift assignments are carefully supervised so that each of the three daily shifts takes over just where the preceding shift left off.

The Maritime Commission, through its buying and transportation departments, purchases all materials and undertakes to keep the necessary supplies delivered as the yard has need of them. The commission's estimate of total labor for each ship is 637,146 man-hours.

The original contract at the Oregon Shipbuilding Corp. yard was for three ships per month. This construction time has been repeatedly cut down and in March of 1942 the Maritime Commission asked for a 105-day construction period (60 days on the ways, 45 days in outfitting). This rate had been met and so far surpassed that one of the three vessels delivered on May 22 had been only 43 days on the ways and 17 days at the outfitting dock, a completed ship in a period of 60 days. Another hull had been launched in 36 days after keel laying. How much more this time will be cut down remains to be seen. That it will be decreased is assured by the confidence of those at the yard who are planning still further economies in methods and routing of materials.

Personnel—Edgar F. Kaiser is vice-president and general manager of the Oregon Shipbuilding Corp.; Albert Bauer is chief engineer and assistant general manager; J. F. Reis is secretary and administration manager; Russell Hoffman is yard superintendent.



● Bacon Tire equipment is now available for direct sale to earth-movers, airport contractors, and others operating heavy mobile equipment who do not have access to commercial tire facilities.

This includes complete tire repair and shop equipment as well as the famous Bacon Recapping Molds which have set enviable records on tires used at Shasta Dam, on long-haul freight runs, by highway departments of many western states and counties, and for the armed forces of the United Nations.

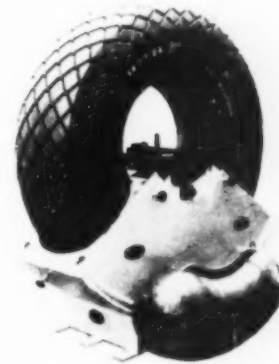
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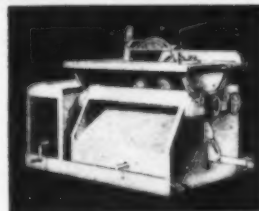
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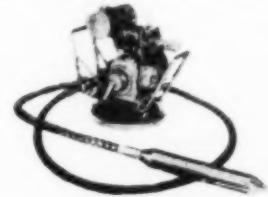
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supplements other advertising in this issue with
these additional announcements of products and
services essential to efficient and economical opera-
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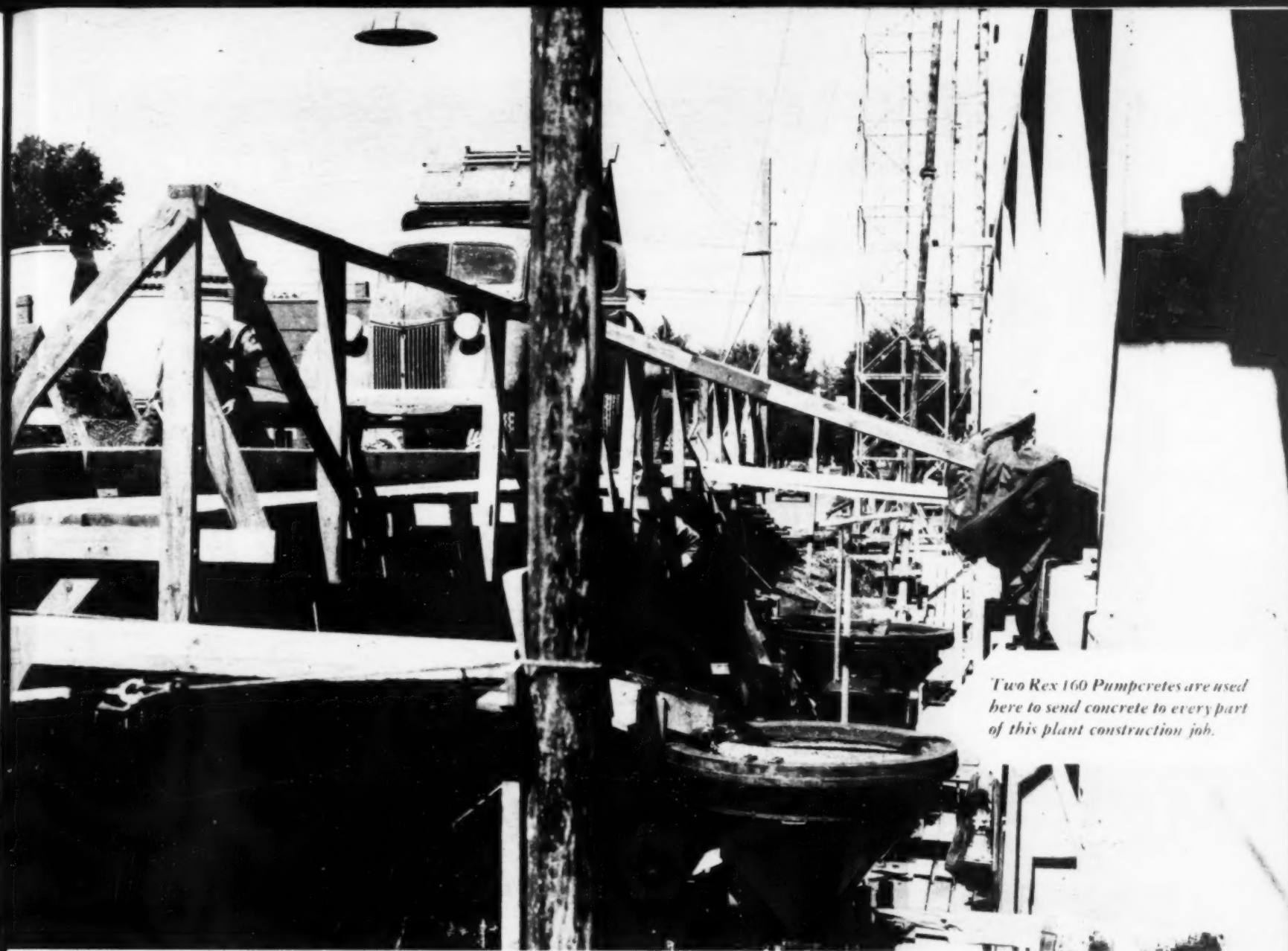
How small tools are applied with profit on
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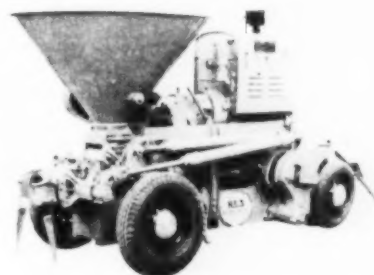
CONSTRUCTION METHODS
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CONCRETE GOING UP... Man-Hour Costs Going Down!

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WHAT'S become of the engineers who said that Pumpcrete just wouldn't do for them? We'll tell you—most of these engineers are now Pumpcrete boosters, who can tell you a story of cost reduction by using the Pumpcrete on everything from tunnel jobs to drydocks, warehouses, piers and emplacements—in fact, on every type of concrete job!

The others? Today, even the "die-hards" are turning to Pumpcrete, too. Because, today, speed is the essence of the job that faces the American construction industry; and speed-

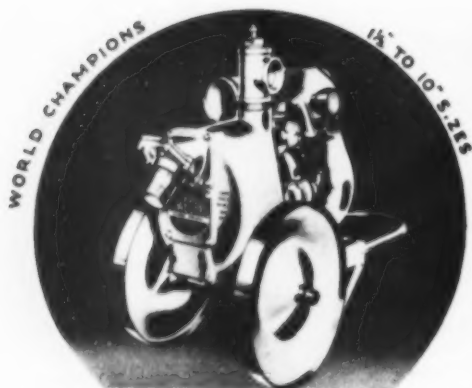
ier placement of concrete is a basic Pumpcrete advantage. Furthermore, the Pumpcrete pipe line doesn't interfere with other construction operations.

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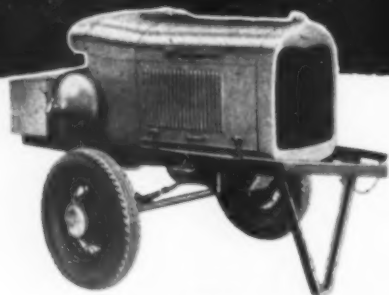
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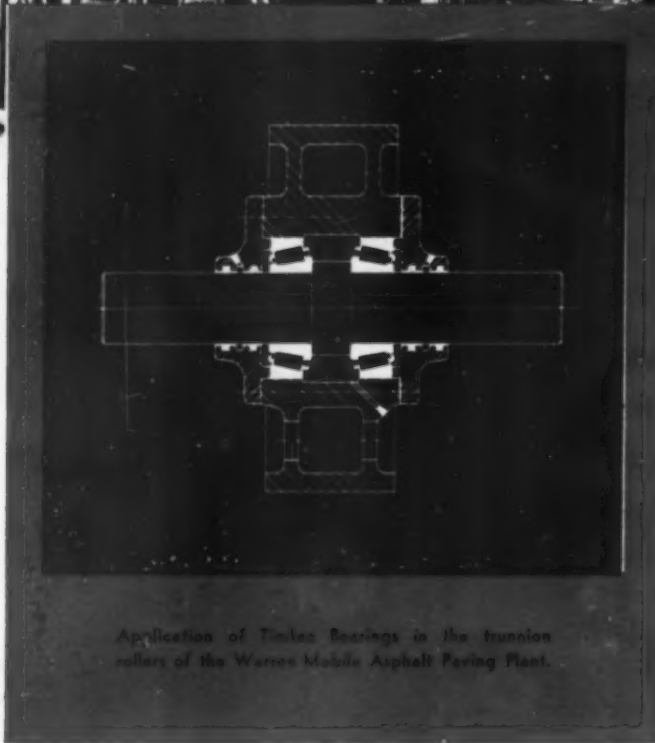
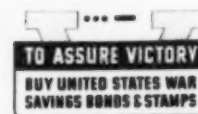
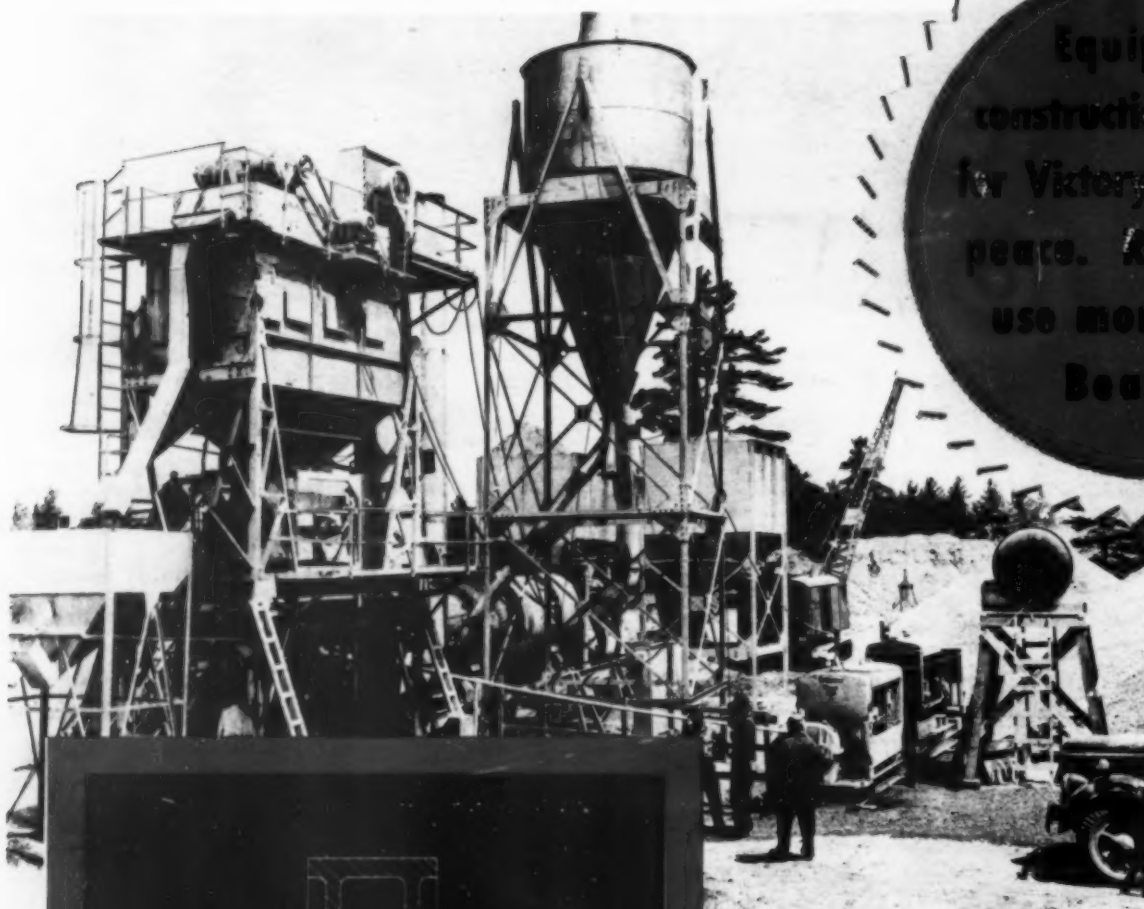
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